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PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS

VOL. XLVIII—No. 4

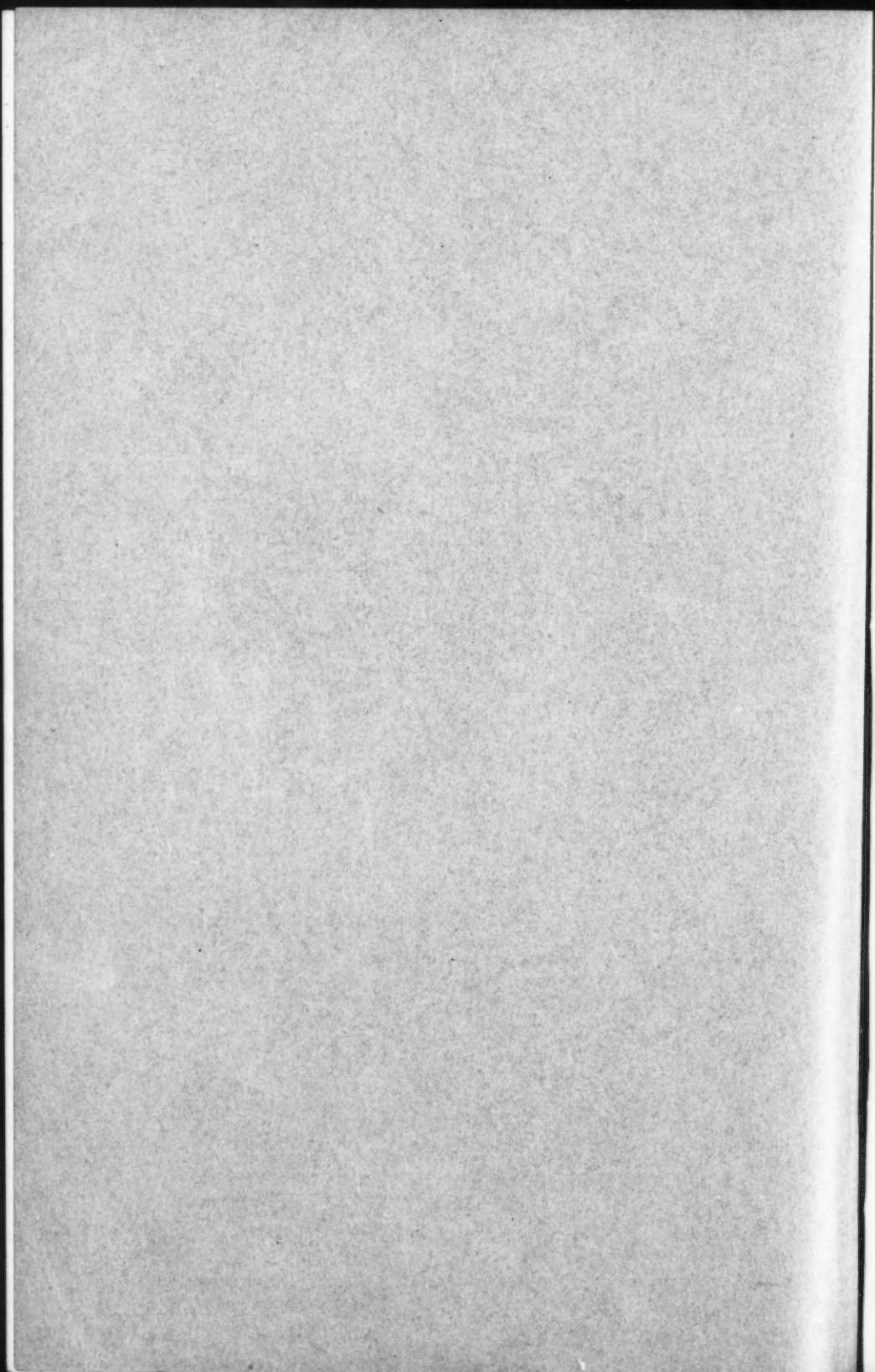


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PROCEEDINGS
OF THE
AMERICAN SOCIETY
OF
CIVIL ENGINEERS
(INSTITUTED 1852)

VOL. XLVIII—No. 4.

APRIL, 1922

Edited by the Secretary, under the direction of the Committee on Publications.

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NEW YORK 1922

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TO CODIFY PRESENT PRACTICE ON THE BEARING VALUE OF SOILS FOR FOUNDATIONS, ETC.: Robert A. Cummings, E. G. Haines, Allen Hazen, James C. Meem, Walter J. Douglas.

TO REPORT ON STRESSES IN RAILROAD TRACK: A. N. Talbot, A. S. Baldwin, G. H. Bremner, John Brunner, W. J. Burton, Charles S. Churchill, W. C. Cushing, W. M. Dawley, H. E. Hale, Robert W. Hunt, J. B. Jenkins, George W. Kiltredge, Paul M. LaBach, C. G. E. Larsson, G. J. Ray, Albert F. Reichmann, H. R. Safford, Earl Stimson, F. E. Turneaure, J. E. Willoughby.

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ON BRIDGE DESIGN AND CONSTRUCTION: Henry B. Seaman, Howard C. Baird, Victor H. Cochrane, Otis E. Hovey, C. W. Hudson, M. S. Ketchum, B. R. Leffler, F. E. Turneaure, J. R. Worcester.

ON CONTRACT STANDARD CLAUSES: H. Eltinge Breed, J. H. Brillhart, J. S. Langthorn, Edward H. Lee, Hunter McDonald, George H. Pegram, Henry H. Quimby.

ON INDUSTRIAL EDUCATION: Herman Schneider, E. J. Mehren, Leonard S. Smith.

ON RESEARCH: A. N. Talbot, F. E. Schmitt, Robert A. Cummings, W. C. Cushing, A. T. Goldbeck, D. C. Henny, R. E. Horton, Anson Marston, F. E. Turneaure.

The Reading Room of the Society is open from 9 A. M. to 6 P. M., and from 7 P. M. to 10 P. M., every day, except Sundays, New Year's Day, Washington's Birthday, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day; during July and August, it is closed at 6 P. M.

HEADQUARTERS OF THE SOCIETY—33 WEST THIRTY-NINTH STREET, NEW YORK.

TELEPHONE NUMBER..... 7100 Longacre.

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AMERICAN SOCIETY OF CIVIL ENGINEERS
INSTITUTED 1852

PROCEEDINGS

This Society is not responsible for any statement made or opinion expressed
 in its publications.

SOCIETY AFFAIRS

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MINUTES OF MEETINGS
OF THE SOCIETY

April 5th, 1922.—The meeting was called to order at 8:15 p. m.; Francis Lee Stuart, M. Am. Soc. C. E., in the chair; C. E. Beam, acting as Secretary; and present, also, 128 members and guests.

The minutes of the meeting of March 1st, 1922, were approved as printed in *Proceedings* for March, 1922.

The following deaths were announced:

FRANK EDWARD BISSELL, of Cleveland, Ohio, elected Junior, April 2d, 1884; Member, September 2d, 1891; date of death unknown.

HARRY DEAN BUSH, of Baltimore, Md., elected Member, May 2d, 1888; died March 15th, 1922.

FRANK CHITTENDEN OSBORN, of Cleveland, Ohio, elected Member, October 3d, 1888; died January 31st, 1922.

LINGAN STROTHER RANDOLPH, of Baltimore, Md., elected Member, January 2d, 1890; died March 7th, 1922.

JOHN RICHARD SAVAGE, of New York City, elected Member, June 7th, 1905; died February 25th, 1922.

EDGAR TRUE WHEELER, of Los Angeles, Cal., elected Member, December 7th, 1904; died March 2d, 1922.

JOSEPH WOOD, of Pittsburgh, Pa., elected Member, April 1st, 1874; died March 4th, 1922.

ROBERT MAX DEGARMO, of Cocoanut Grove, Fla., elected Associate Member, November 4th, 1914; died February 14th, 1922.

WILLIAM ARTHUR LAFLER, of Rochester, N. Y., elected Associate Member, May 4th, 1909; died January 19th, 1922.

The election of the following candidates on April 3d, 1922, was announced:

AS MEMBERS

LOUIS MILTON ADAMS, Galveston, Tex.

WALTER SIDNEY BOBO, Clarksdale, Miss.

ORA BUNDY, Ogden, Utah

CHARLES DWIGHT CURTISS, Washington, D. C.

JAMES HOPKINS DOUSMAN, Kansas City, Mo.

ROBERT JAMES HALLIDY, Delhi, India

FORREST SHEPHERD HARVEY, Baltimore, Md.

WILLIAM PIERCE HOPPIN, Chicago, Ill.

HENRY BAKER LYNCH, Los Angeles, Calif.

UMBERTO ERNESTO MARTINI, Rome, Italy

JAMES EDWARD PIRIE, Ballinger, Tex.

PORTER JOHSTONE PRESTON, Yuma, Ariz.

EUGENE SCHAUB, Logan, Utah

ALBERT MASER TRAUGOTT, Norfolk, Va.

AUGUST JOHN WERNER, Los Angeles, Calif.

FRANK CLINTON WIGHT, New York City

AS ASSOCIATE MEMBERS

HAROLD WARD BARKER, Detroit, Mich.

CARL WILLIAM BECK, Bellevue, Pa.

CLAUD FRANCIS BLAIN, Sydney, New South Wales, Australia

EARNEST BOYCE, Lawrence, Kans.

FRANCIS ALOYSIUS BOYLE, New York City

SIGMUND BRAVERMAN, Akron, Ohio

KENYON HARRINGTON CLARK, San Luis Obispo, Calif.

ROBERT HENRY CLINGER, Dallas, Tex.

ALBERT EDWARD CUMMINGS, Chicago, Ill.

ERNEST AMBROSE DOCKSTADER, Boston, Mass.

JOHN ARNOLD DONALD, Wichita Falls, Tex.

ROBERT SEWALL DUBois, Denver, Colo.

BOWIE GRIFFITH ETCHISON, Charleston, W. Va.
GEORGE DEVORE FAIRTRACE, Dallas, Tex.
JOHN SHERROD FENNER, Kaufman, Tex.
HENRY ALDEN FOSTER, South Orange, N. J.
OLAF FROSETH, Chicago, Ill.
CHARLES HENRY GAEDCKE, Elizabeth, N. J.
JOHN HENRY GAYNOR, New York City
HARRY SIMMERMAN GIBBONEY, Atlanta, Ga.
CHARLES RIVIERE GOODMAN, Orange, Tex.
HAROLD MOFFET GOULD, Detroit, Mich.
CHESLEIGH GRAY, Indianapolis, Ind.
CLYDE ELBERT HEALY, San Francisco, Calif.
HENRY WILLIAM HEMPLE, Washington, D. C.
GEORGE EARL HILL, Carroll, Iowa
ALFRED TURRILL HOPKINS, Detroit, Mich.
WILLIAM DAVIS HOWREN, Amarillo, Tex.
LEONARD AUGUSTUS IDLE, Oklahoma, Okla.
LAWRENCE LEE JEMISON, Charleston, W. Va.
WARDELL D. JOHNSTON, Waterloo, Iowa
ERNEST LESTER JONES, Washington, D. C.
GEORGE VAN SISE KEELY, Port of Spain, Trinidad
JOHN LONSDALE LAMB, Brooklyn, N. Y.
EDWARD GUSTAF LARSON, White Plains, N. Y.
WILLIAM WILLSON MCCLEVY, Roanoke, Va.
JOHN ALEXANDER MCLEAN, Crookston, Minn.
HENRY LOUIS MAURER, New Bremen, Ohio
RALPH PETER MELENDY, Wichita Falls, Kans.
NATHAN WILSON MORGAN, Denver, Colo.
EARLE HEDDERICH MORRIS, Bismarck, N. Dak.
EDWARD TOWLER MURCHISON, Chicago, Ill.
STEWART SMITH NEFF, Maracaibo, Venezuela
JAMES BLAINE NEWMAN, Ann Arbor, Mich.
REEVES JOSE NEWSOM, Lynn, Mass.
FRANK BENJAMIN OGLE, Coleman, Tex.
HARRY CONNELLY ORR, Charleston, S. C.
WILLARD EASTMAN SIMPSON, San Antonio, Tex.
GEORGE JAMES STEIN, Miami, Okla.
NELSON STONE, Syracuse, N. Y.
FRANK DEWITT TALBOT, Sacramento, Calif.
LLOYD WEBB TAYLOR, Decatur, Tex.
TINPH WEITSON TU, Harbin, China
JOSEPH HOUSTON WASSON, Lansing, Mich.
WARREN GARDNER WHITE, Tipton, Iowa
FRANK DAY WILCOX, Los Angeles, Calif.
ROBERT WILSON, Victoria West, Cape Colony, South Africa
POND SHEPPON WU, Shanghai, China

AS AFFILIATES

MALCOLM DUNBAR RIKER, Dover, N. J.

AS JUNIORS

CARL OSBORN BARTON, Detroit, Mich.
KARL FERDINAND BIEHLER, Los Angeles, Calif.
MANUEL DE COMINGES TAPIAS, Vigo, Spain
WILLIAM BENEDICT DELEHANTY, Edgewater, N. J.
SIMON WILKE FREESE, Fort Worth, Tex.
JOHN CHARLES GEBHARD, New York City
JOSEPH HENRY GLIDDEN, Ellensburg, Wash.
BENJAMIN SHEPPARD GOLDMAN, Brooklyn, N. Y.
CASIMIRO OSVALDO GOMEZ RODRIGUEZ, Santo Domingo,
Dominican Republic
FRANCIS KENNEDY GREEN, Middleburg, Va.
JAMES HORACE HENDRY, Hartford, Conn.
HAROLD CALVIN HUFFORD, Liberty, Mo.
OTTO LAUTERHAHN, Trenton, N. J.
RALPH ALTON MOYER, Ames, Iowa
PERCY VIVIAN PENNYBACKER, Shamrock, Tex.
ROWLAND CUTHBERT ROBIN, Gilberton, South Australia
BENJAMIN SALTZMAN, Brooklyn, N. Y.
HORACE ADALI SAWYER, Breckenridge, Tex.
JOHN ALLEN SCOVILLE, Mare Island, Calif.
CHILTON AUSTIN WRIGHT, New Rochelle, N. Y.

The transfer of the following candidates on April 3d and 4th, 1922, was announced:

FROM ASSOCIATE MEMBER TO MEMBER

EDWARD ANDERBERG, New York City
JOSEPH EDGAR BELL, Butte, Mont.
JOSEPH BRANDLY CONVERSE, New Orleans, La.
WILLIAM OWEN COTTON, Idaho Falls, Idaho
JOHN WHITFIELD COWPER, Buffalo, N. Y.
LYNN CRANDALL, Mackay, Idaho
HARRY JOCELYN DIGNUM, Baraguá, Camaguey, Cuba
NATHAN WASHINGTON DOUGHERTY, Knoxville, Tenn.
FORREST FAYE FRAZIER, Manhattan, Kans.
FRANCIS EUGENE FREELAND, Nashville, Tenn.
GEORGE STEVENS HINCKLEY, Redlands, Calif.
WILLIAM WHITEHEAD HURLBUT, Los Angeles, Calif.
GEORGE WALTHER KOSS, Des Moines, Iowa
JOHN FRANCIS LABOON, Pittsburgh, Pa.
CLAUDE MILTON LAMBE, Raleigh, N. C.
FRANK RAY LANAGAN, Albany, N. Y.

ROBERT JOHN ROSS, Hartford, Conn.
WALTER ELLSWORTH ROWE, New Orleans, La.
CHARLES WESLEY SCHUBERT, Cleveland, Ohio
THOMAS WILLIAM SECREST, Anchorage, Alaska
WILLIAM ALBIE VAN DUZER, Harrisburg, Pa.
EMANUEL LOUIS VERVEER, New York City
MARTIN WALLACE WATSON, Topeka, Kans.
GEORGE PHILIP WINN, Nashua, N. H.

FROM JUNIOR TO ASSOCIATE MEMBER

EDWIN RYAN AKERS, Havana, Cuba
CHARLES WIGHTMAN BARBER, Washington, D. C.
LEO FRANCIS BROWN, Brooklyn, N. Y.
GEORGE DASHIELL CAMP, Calcutta, India
PAUL FRANCIS CRITZ, Ames, Iowa
NASRI SULEIMAN FULEIHAN, Jerusalem, Palestine
LAWRENCE SCOFIELD HOLMBOE, Oklahoma, Okla.
JOHN LOWERY, Jr., Ambridge, Pa.
WILLIAM SING-CHONG PUNG, Shanghai, China
ALVIN CHRISTIAN RASMUSSEN, Indianapolis, Ind.
OSWALD SPEIR, Jr., Visalia, Calif.
NORMAN KENNETH WILSON, Milwaukee, Wis.

A paper by Gustav Lindenthal, M. Am. Soc. C. E., entitled "The Continuous Truss Bridge over the Ohio River at Sciotosville, Ohio, for the Chesapeake and Ohio Northern Railway", was presented by the author, who illustrated his remarks with lantern slides. The subject was discussed by Messrs. Francis Lee Stuart, T. Kennard Thomson, H. H. Quimby, Theodore Belzner, G. E. Beggs, and H. W. Troelsch. A written discussion on the subject by C. A. P. Turner, M. Am. Soc. C. E., was also received.

On motion, duly seconded, a resolution of regret at the great number of deaths announced was adopted.

On motion, duly seconded, a vote of thanks was extended to Mr. Lindenthal for his paper.

Adjourned.

MINUTES OF MEETINGS OF
SPECIAL COMMITTEES TO REPORT ON ENGINEERING SUBJECTS

Minutes of Meeting of Special Committee on Stresses in Railroad Track

March 14th, 1922.—The meeting was called to order at the Congress Hotel, Chicago, Ill. Present: Messrs. A. N. Talbot (Chairman), Bremner, Brunner, Burton, Churchill, Cushing, Gennett (for Hunt), LaBach, Larsson, Ray, Reichmann, and Stimson.

Letters stating their inability to attend the meeting were received from Messrs. Dawley, Hale, Kittredge, and Willoughby, and Messrs. Baldwin and Safford who were also unable to attend the meeting, had presented their views on the proposed discussion in advance.

The Chairman presented a statement of progress in the reduction and preparation of data of tests on railroad track and an outline of future work. After a general discussion of this statement, the members of the Committee, on motion, duly seconded, adopted the plans presented by the Chairman.

Special Committee on General Form of Contract Standard Clauses

January 19th, 1922.—The first meeting of the Committee was called to order at 11 A. M., at the Headquarters of the Society. Present, George H. Pogram, Henry H. Quimby, and J. S. Langthorn (Secretary).

Mr. Langthorn was elected Temporary Chairman.

The \$500 budget for 1922 was discussed, and it was agreed that the limited amount required that the work of the Committee be done mainly by correspondence and with meetings to be held as far as possible at the time of the annual meetings of the Society.

The minutes of the Washington, D. C., Conference, held December 15th, and 16th, 1922, in the Department of Commerce Building, were discussed. It was announced that a Sub-Committee of the Washington Conference had been appointed to prepare for the next meeting of the Conference in Washington, a tentative document for further consideration.

It was agreed that the Committee's objects would be best achieved by co-operating with the National Conference at Washington, and thus attain joint action of all the elements of the construction industry.

The "Standard Form of Agreement between Owner and Contractor", adopted by the Texas Section of the Society on October 28th, 1921, and sent to each member of the Committee by J. H. Brillhart, M. Am. Soc. C. E., was discussed, particular attention being given to the arbitration clause.

Certain suggestions of the Committee on Engineering Contracts of the Engineering Association of Nashville, Tenn., adopted by that Association, were forwarded by Hunter McDonald, Past-President, Am. Soc. C. E., presented to the Committee, and discussed.

Mr. Quimby presented several contracts of the City of Philadelphia and called attention to the provision for a time charge which acts as an automatic bonus and penalty scheme. He stated that it has been used satisfactorily for eight years.

On motion duly seconded, the meeting was adjourned subject to the call of the Chairman.

ITEMS OF INTEREST

This Society is not responsible for any statement made or opinion expressed in its publications.

The Committee on Publications will be glad to receive communications of general interest to the Society, and will consider them for publication in *Proceedings* in "Items of Interest". This is intended to cover letters or suggestions from our membership concerning matters which are not of a technical character. Such communications, however, must not be controversial or commercial.

Report of Volunteer Committee on Employment, of the Federated American Engineering Societies

The Volunteer Committee on Employment begs to submit the following report of its activities.

The latest advices show that, besides the New York City Committee, Volunteer Committees are operating in the following centers: Baltimore, Md., Birmingham, Ala., Boston, Mass., Bridgeport, Conn., Buffalo, N. Y., Chicago, Ill., Cleveland, Ohio, New Haven, Conn., Columbus, Ohio, Jersey City, N. J., Milwaukee, Wis., Newark, N. J., New Orleans, La., and St. Louis, Mo.

Reports are also being made to establish committees in: Detroit, Mich., Los Angeles, Cal., Philadelphia, Pa., Utica, N. Y., and Washington, D. C.

Reports on results achieved by committees outside of New York City are not available, but it appears that most of the volunteer activity centers in New York City, the other branches being still in the formative stage, or, at least, have not gotten fully under way.

The results of the work in New York City have been encouraging. Recently, calls have been made by committee members in lines of business in which the member himself is interested. This division of calls is felt to be a great improvement over the former system of miscellaneous calls by geographical location.

In general, a distinct improvement in business confidence and in the number of jobs available has been found. This is shown in Table 1, which reflects the continually increasing efforts of the Committee.

TABLE 1.

	Calls.	Bureau unknown.	Jobs.	Prospects.
Nov. 21st to Dec. 31st, 1921.....	312	112	9	19
Jan. 1st to Mar. 10th, 1922.	1 496	597	96	116

These noteworthy results, nearly 1500 calls made since the first of the year, 96 jobs uncovered, and 116 prospects, have been due to an increase in

the membership of the Committee, a more active directional policy, and a general increase in morale. The number of committee men has increased as follows: 8 on January 3d, 1922; 9 on February 1st, 1922; 21 on March 1st, 1922; and 23 on March 10th, 1922. Of the 23 members on March 10th, 7 have been on executive work, the remainder being "Field Men".

The work of the Employment Bureau as a whole, which includes the efforts of the Volunteer Committee, during the first two months of 1922, compares favorably with the same period in 1921. Table 2 shows this in detail.

TABLE 2.

	1921.			1922.			Net change for two-month period.
	January.	February.	Total.	January.	February.	Total.	
New men registered..	195	174	369	142	138	280	-89
Positions received....	120	111	231	186	233	419	188
Men placed.....	91	107	198	131	114	245	47

With 89 fewer new men registered, 188 more positions available, and 47 more men placed, the improvement as compared with 1921, for the same period, is unquestioned.

Conference on Business Training of Engineers and Engineering Training for Students of Business

The United States Commissioner of Education is calling a Second Public Conference on Commercial Engineering on behalf of a Committee on Commercial Engineering appointed by him to investigate the business training of engineers and engineering training for students of business.

The conference will be held May 1st and 2d, 1922, at the Carnegie Institute of Technology in Pittsburgh, Pa. President Arthur Hamerschlag, of the Institute, is a member of the Committee which is composed of prominent deans of schools of engineering, of commerce in the larger universities, and of engineers and business men who are Nationally known for their interest in the reduction of the costs of production, distribution, transportation, etc., through better training in schools and colleges of the personnel of industry and commerce.

The Conference will be open to the public. Invitations to appoint delegates to the Pittsburgh Conference, however, will be sent by the Commissioner of Education to commercial and trade organizations, engineering and scientific societies, educational institutions, and other groups, as well as to prominent individuals.

Owing to the timeliness of the subject, the Conference in Pittsburgh will even have greater National significance than the First Public Conference on this question, which was held in Washington, D. C., two and one-half years ago under the direction of this Committee on Commercial Engineering of which Dr. Glen Levin Swiggett, of the Bureau of Education, is Chairman.

The four major topics of the conference, it is stated, will be presented and discussed at general and round table sessions by business men, educators, and engineers, contributing to the construction of a co-operative program between education and business for the better co-ordination of all productive and distributive processes in trade and commerce. It is planned to have the Second Conference even more constructive than the first, since which time the curricula of 29 of the 119 engineering colleges reporting to the Bureau of Education have been favorably modified to include one or more of the four Committee recommendations. Outstanding topics at the Pittsburgh Conference will deal with the new problems that have recently arisen in modern industries, the solution of which demands a more scientific approach to include job analyses and personnel specifications, and a translation of these into a new and teachable content for use in engineering and commercial schools; with the training of the engineer for a better understanding of problems relating to community development; and with training of the engineer for management of overseas engineering projects.

ACTIVITIES OF LOCAL SECTIONS*

Meeting of Colorado Section

A regular meeting of the Colorado Section was held at the Metropole Hotel, Denver, Colo., on February 13th, 1922; President A. N. Miller in the chair; Thomas H. Olds, Secretary; and present, also, 11 members and 1 guest.

President Miller announced the resignation of Mr. Walter L. Drager as Secretary-Treasurer, and the appointment of Mr. Thomas H. Olds to complete the unexpired term.

Mr. L. E. Thompson, President and General Manager of the Thompson Manufacturing Company, gave an interesting lecture on "Metal Flumes", emphasizing particularly the life of flumes constructed of galvanized iron, pure iron, and zinc. He discussed briefly the history of flumes and the search for a metal that would successfully resist corrosion, presenting the results of a number of tests to determine the loss of weight by corrosion of various metals used in the manufacture of flumes.

The minutes of the two previous meetings of the Section were read and approved.

The Secretary presented a letter from the Colorado Engineering Council in regard to the adoption of the metric system. A motion to advise the Engineering Council that the Section favors the adoption of the metric system was defeated, and no further action was taken.

Mr. Arthur Ridgway was elected as delegate and Mr. H. S. Crocker as alternate delegate to the Colorado Engineering Council.

A blank resolution proposed by the Colorado Engineering Council requesting the Mayor of Denver to arrange for the purchase of a block on Bannock Street, in order to prevent the erection of a commercial building and to provide a site for a county and municipal building, was read, and on motion, duly seconded, was adopted.

Mr. H. S. Crocker spoke briefly on the status of the plans for the new or reconstructed Sixteenth Street Viaduct, and the manufacture of high-pressure concrete conduits was discussed briefly by Mr. W. B. Freeman.

Meetings of Duluth Section

A regular meeting of the Duluth Section was called to order at 12:15 p. m., February 20th, 1922; President John L. Pickles in the chair; W. G. Zimmermann, Secretary; and present, also, 21 members.

The minutes of the meeting of January 16th, 1922, were read and approved.

Mr. E. K. Coe presented a report of the Committee on City Planning in Duluth, and stated that the recommendations adopted by the Committee for the proposed City Planning Ordinance had been accepted by the Mayor and incorporated in the revised ordinance. On motion, duly seconded, the revised ordinance was endorsed by the meeting, and the Secretary was instructed to notify the Mayor to that effect.

A letter was presented from Mr. Richard L. Humphrey in regard to the vote on the proposed amendments to the Constitution of the Society to be

* For list of Local Sections, Officers, etc., see p. 340.

canvassed on March 1st, 1922, and the subject was discussed in detail by Mr. O. H. Dickerson who also made a report on the Annual Meeting of the Society in New York City.

Mr. W. E. Hawley reported on the subject of the Society becoming a member of the Federated American Engineering Societies, and on motion, duly seconded, the following resolution was adopted:

"Whereas: The movement to strengthen the position of the American Professional Engineer by securing unity of effort between the various branches of engineering has brought forth the Federated American Engineering Societies;

"Whereas: This organization has been in useful and successful operation in its pursuit of the work for which it was organized over a year ago;

"Whereas: Individual members of the American Society of Civil Engineers have taken an active interest in assisting the new organization, thereby exerting a large influence on its welfare in the work of raising the engineer to a higher position in the national affairs;

"Whereas: The American Society of Civil Engineers has not as yet through its official acts become a member society of the Federated American Engineering Societies;

"Whereas: The efforts of the Federated American Engineering Societies redounds to the benefit of the individual members of the American Society of Civil Engineers and yet the American Society of Civil Engineers does not financially support the Federated American Engineering Societies;

"Be it Resolved: That the Duluth Section of the American Society of Civil Engineers hereby express its belief that the parent society should assume its share of the financial support of the Federated American Engineering Societies by officially joining it as soon as the financial affairs of the American Society of Civil Engineers can be adjusted to meet the new responsibility;

"Further: That those members of the American Society of Civil Engineers who have already aided the Federated American Engineering Societies be commended and the membership at large be asked to lend every possible aid to the new federation to increase its services to the public and its value to the engineer;

"Further: That a copy of these resolutions be sent to the Board of Direction of the American Society of Civil Engineers and that they be asked to send out to the membership of the Society a letter-ballot providing therein for a vote of approval or disapproval of the American Society of Civil Engineers by appropriate action joining the Federated American Engineering Societies.

"Further: That a copy of these resolutions be sent to the various Sections and to the Executive Secretary of the Federated American Engineering Societies."

MEETING OF MARCH 20TH, 1922

A regular meeting of the Section was held on March 20th, 1922, at 12:15 P. M.; President John L. Pickles in the chair; W. E. Hawley, Acting Secretary; and present, also, 20 members and 1 guest.

The minutes of the meeting of February 20th, 1922, were read and approved.

A letter from the Acting Secretary of the Society was presented, relative to his visit to the Duluth Section next fall. He also outlined the plans for the Spring Meeting at Dayton, Ohio, the summer Convention at Portsmouth, N. H., and the Fall Meeting on the Pacific Coast.

Mr. F. Hutchinson, as Chairman of the Committee, reported on the circular letter from the Acting Secretary relative to the publication in *Proceedings* of sections of the Catalog of the Engineering Societies Library. After discussion by Messrs. Hoyt, Stack, Coe, Swart, and Taylor, on motion, duly seconded, the following resolution was adopted:

"Resolved: That the Duluth Section cordially approves the publication in the January *Proceedings*, of a catalog of literature upon Highway Engineering. It is the opinion of the Duluth Section that the best interests of the Society will be served by deferring the publication of the balance of the Engineering Societies Library Catalog until such time as it can be issued in loose leaf or pamphlet form.

"If it be finally thought advisable to publish further portions of the Catalog, we suggest that such portions be issued as separate pamphlets."

A paper on "Standardization" was presented by Mr. W. A. Clark, in which he outlined the past history and present progress of the movement and its advantages and defects, and the subject was discussed by Messrs. Hoyt, Hawley, Stack, Taylor, and Woodbury.

Organization and Meetings of the Dayton Section

The decision to organize a Dayton Section was made at a meeting at the Engineers Club, Dayton, Ohio, on January 23d, 1922. A Constitution was adopted and forwarded to the Board of Direction for approval. On receipt of its approval, a meeting was held at the Engineers Club, on February 27th, 1922, at which the Dayton Section was formally organized and the following officers were elected: President, Charles H. Paul; First Vice-President, J. H. Kimball; Second Vice-President, O. N. Floyd; and Secretary-Treasurer, K. C. Grant.

At this meeting the report of the Committee of Local Arrangements for the Spring Meeting of the Society to be held in Dayton, was approved and the program adopted to supplement the technical program was forwarded to the Secretary of the Society.

On February 20th, 1922, the members of the Section entertained the Acting Secretary at a luncheon at the Engineers Club. The program for the Spring Meeting of the Society was outlined, and there was considerable discussion as to the entertainments, excursions, etc.

On February 29th, 1922, a meeting of the Section was held at the Engineers Club, at which the detailed program of the Spring Meeting was discussed and approved.

New York Section Participates in Joint Meeting on the Port of New York

The Third Joint Meeting of the Metropolitan Sections of the Founder Societies was held in the Auditorium of the Engineering Societies Building on March 15th, 1922; President Nelson P. Lewis, of the New York Section of the American Society of Civil Engineers, in the chair; J. P. J. Williams, Secretary; and present, also, about 850 members and guests.

The subject of the evening, "The Development of the Port of New York", was presented by Messrs. E. H. Outerbridge, Chairman of the Port of New

York Authority, and B. F. Cresson, Jr., Chief Engineer. Owing to urgent business engagements, it was impossible for Messrs. E. B. Temple, Assistant Chief Engineer of the Pennsylvania Railroad, and J. J. Mantell, General Manager of the Erie Railroad, to be present and speak for the railroads. Mr. Morris R. Sherrerd, Consulting Engineer, of Newark, N. J., discussed the subject as it affected the New Jersey side of the Port, and Messrs. John Francis and P. V. Stephens made brief remarks from the floor.

In addition to the general outline of the plans of the Port Authority and the powers vested in it, Mr. Cresson explained in detail the extensive organization proposed by the Port Authority at the time of the threatened strike of the railroad workers, which, with studies of the needs of the City in order to provide daily food requirements, is available if any such emergency should arise.

A moving picture film of the Port was shown, in which the complete transportation history of a common article of food through the city to its destination was represented.

SUB-SECTION CONFERENCE ON DETAILS OF DESIGN

At 5:15 p. m., preceding the Joint Meeting on March 15th, 1922, the first of a series of three conferences which had been decided on as the result of the questionnaire sent to members of the Section, was held to consider the subject, "The Importance of the Design of Details, as Evidenced by Recent Theater Failures." An attendance of about 65 showed the interest of the membership, which was further demonstrated by the active participation of many of those present in the discussion. Under the chairmanship of Mr. James H. Edwards, Assistant Chief Engineer of the American Bridge Company, the important details in the design of the Knickerbocker Theater, Washington, D. C., and many other examples of questionable structural detailing, were freely illustrated. The question of responsibility for such failures was raised, and suggestions that more definite laws placing responsibility should be passed, were made.

On motion, duly seconded, and carried, the meeting approved the plan proposing two other conferences on related topics, to be held on the afternoons preceding the regular meetings in April and May, and elected Mr. Edwards to act as Chairman at such Sub-Section meetings.

Meeting of Pittsburgh Section

A meeting of the Pittsburgh Section was held at the Hotel Chatham, on February 24th, 1922; Vice-President J. L. De Vou in the chair; Nathan Schein, Secretary; and present, also, 34 members.

J. H. Edwards, M. Am. Soc. C. E., and Elbert M. Chandler, Acting Secretary of the Society, were present as guests.

The minutes of the previous meeting of the Section were read and approved.

The Secretary reported that the Section had received the sum of \$169 from the Society as its share of the distribution of the funds to Local Sections.

The Secretary presented the report of the meeting of the Executive and Activities Committee of the Section, which was held on February 15th, 1922.

The following names of members of the Section were submitted to the Student Chapter of the University of Pittsburgh as speakers at its meetings: Messrs. E. J. Dilworth, J. L. De Vou, Richard Khuen, A. W. Thompson, J. N. Chester, George S. Davison, Morris Knowles, E. K. Morse, and C. L. Wooldridge.

On motion, duly seconded, the Secretary was instructed to prepare a circular letter to resident members of the Society in this District, informing them of the activities of the Section and urging them to become members of the same.

It was announced that the Executive Committee had endorsed the action of the Pittsburgh Associated Engineers Society in inviting the Executive Board of the American Engineering Council to Pittsburgh for its May meeting, and on motion, duly seconded, the Secretary was instructed to pay the Section's portion of expense of the meeting of the Federated American Engineering Societies in Pittsburgh.

The Secretary announced that the return of the letter-ballot on the question of the Society joining the Federated American Engineering Societies stood 72 for and 8 against the proposition.

On motion, duly seconded, it was decided to postpone the discussion on the advisability of presenting engineering papers before the Section until a later meeting.

An address on the motives of members in presenting papers at meetings was made by Mr. Edwards. He was followed by Mr. Chandler who discussed the meeting of the Society at Dayton, Ohio, and the work of the Society.

On motion, duly seconded, a vote of thanks was extended to Mr. Edwards and Mr. Chandler.

On motion, duly seconded, the Section commended the action of the Board of Direction in sending the Acting Secretary to visit the Local Sections.

On motion, duly seconded, the Chairman was instructed to appoint a committee to canvass the Section with reference to those who wish to attend the Spring meeting of the Society in Dayton, Ohio, and Vice-President De Vou subsequently appointed Messrs. E. D. Davis, Maurice Scharff, and L. J. Riegler as such committee.

After the adjournment of the meeting, an informal reception was tendered Acting Secretary Chandler of the Society.

Meeting of Portland Section

A meeting of the Portland Section was called to order at the University Club at 8 p. m.; President F. M. Randlett in the chair; C. P. Keyser, Secretary; and present, also, 29 members.

The minutes of the meeting of February 17th, 1922, were read and approved.

Mr. G. C. Mason, Chairman of the Committee on Redraft of the Constitution of the Section, presented a draft of a constitution and moved its

adoption, which motion was seconded. The Secretary read the report of the Committee, and after considerable discussion a motion to adopt the revised Constitution section by section was lost. The original motion was then adopted, and the Committee was discharged with the thanks of the Section.

Mr. R. G. Dieck, Chairman of the Committee on Prizes for papers by engineering students at the Oregon Agricultural College, presented a report of that Committee. After discussion and the adoption of two amendments, which were accepted by the Chairman of the Committee, the report was, on motion, duly seconded, accepted.

On motion, duly seconded, the Secretary was instructed to reply to a letter of Acting Secretary Chandler bearing on the question of allocating dues, stating that all members of all grades in good standing in the Society and resident in Oregon were in good standing with the Portland Section on January 1st, 1922.

On motion, duly seconded, it was decided to accept the invitation of Mr. E. B. Thomson to join the members of the Portland Chapter of American Military Engineers in a visit to the Oregon Agricultural College on April 1st, 1922.

The meeting was then turned over to Mr. C. N. Bennett who conducted a discussion of the question now before the Section on "Shall the American Society of Civil Engineers join the Federated American Engineering Societies". The discussion was opened by Mr. Bennett who reviewed the history of the organization. He was followed by Messrs. Berni, McKesson, White, Schubert, and Brown. On motion, duly seconded, after lengthy discussion, the following resolution was adopted:

"Resolved: That it is the opinion of the Portland Section, Am. Soc. C. E., that no action should be taken at this time toward a reconsideration of the decision as expressed by letter ballot of Nov. 8th, 1920, that the American Society of Civil Engineers should not become affiliated with the Federated American Engineering Societies".

Meetings of the St. Louis Section

A regular meeting of the St. Louis Section was called to order at the American Annex on January 23d, 1922; President E. B. Fay in the chair; William C. E. Becker, Secretary; and present, also, 17 members and 1 guest.

The minutes of the previous meeting were read and approved.

A letter from the St. Louis Citizens' New Constitution Association, asking for co-operation in formulating suggestions to the Constitutional Convention, was presented, and, on motion, duly seconded, Mr. W. W. Horner was delegated to present any suggestions to the Association from members of the Section.

On motion, duly seconded, a resolution on the death of Hiram Phillips, M. Am. Soc. C. E., prepared by Messrs. E. E. Wall, J. T. Garrett, and S. Bent Russell, was read and adopted. A memoir of the late Mr. Phillips prepared by the same Committee, was also read and approved and, on motion, duly seconded, ordered sent to the Acting Secretary of the Society for publication in *Proceedings*.*

* See p. 1039 of Papers and Discussions.

Messrs. Baxter L. Brown and E. E. Wall presented brief accounts of the Annual Meeting of the Society.

On motion, duly seconded, the Secretary was instructed to send a special letter to those members of the Society in St. Louis not members of the Section inviting them to join.

The subject, "What Should Be Done by Engineers to Prevent the Practice of Competing Bidders Making Unfair Use of Each Other's Designs when Complete Plans Are not Furnished by the Purchaser", was presented and discussed by Messrs. J. T. Garrett, F. D. Hughes, Baxter L. Brown, S. Bent Russell, and R. P. Garrett. The discussion brought out the fact that the practice was not so popular at present on account of the expense of preparing plans, and that the best that engineers could do to prevent it was to give the practice publicity and censure it.

MEETING OF FEBRUARY 27TH, 1922.

A regular meeting of the St. Louis Section was called to order at the American Annex on February 27th, 1922; President E. B. Fay in the chair; William C. E. Becker, Secretary; and present, also, 17 members and 1 guest.

The minutes of the previous meeting were read and approved.

Letters were presented from the Acting Secretary of the Society relative to the Spring Meeting to be held at Dayton, Ohio, on April 5th and 6th, 1922, and to the allocation of a portion of the dues of its members to the Section.

The Secretary presented a letter from the Engineers Club of Kansas City relative to an Engineering Congress to be devoted to a symposium on the "Petroleum Industry", to be held at Kansas City, Mo., on March 6th and 7th, 1922.

Mr. E. E. Wall announced that \$21 of a fund raised by the Section was available, and on motion, duly seconded, it was voted to offer this sum as a subscription from the Section to the James Buchanan Eads Fund.

Discussion on the subject "To What Extent Can the Development of St. Louis and East St. Louis Be Promoted Through the Operation of Metropolitan Districts", was opened by Mr. H. Wright, Architect for the City Plan Commission. After a brief discussion by several members present, it was decided, on motion, duly seconded, to continue the discussion at the next meeting of the Section.

Meeting of Seattle Section

The regular meeting of the Seattle Section was held at the Engineers' Club on February 27th, 1922; President F. F. Sinks in the chair; Frank H. Fowler, Secretary; and present, also, 21 members.

The minutes of the meeting of January 30th, 1922, were read and approved.

On motion, duly seconded, the Secretary was instructed to postpone action regarding the binding of the volumes of *Proceedings*, donated to the Section by the Society, until the next meeting.

The address of the evening was delivered by Mr. Ralph Stacey, who spoke on the subject of "Intelligent Patriotism".

Announcement was made of the appointment by the Chairman of the members of the Advisory Committee, Membership Committee, Legislative Committee, Parent Relationship Committee, Entertainment Committee, Program Committee, and Intersectional Society Committee.

On motion, duly seconded, the Secretary was authorized to consult with the Spokane Section on the matter of territorial limits embraced by the Spokane and Seattle Sections.

The question of members who reside within the State of Washington and adjacent to the Columbia River affiliating themselves with the Portland Section was discussed, and, on motion, duly seconded, the Secretary was instructed to take up the matter with members of the Society in Vancouver, Wash.

EMPLOYMENT SERVICE OF THE FEDERATED AMERICAN ENGINEERING SOCIETIES

An Engineering Societies Service Bureau was established December 1st, 1918, as an activity of Engineering Council, managed by a board made up of the Secretaries of the four Founder Societies, funds for its maintenance being provided by these Societies. On January 1st, 1921, this Bureau was taken over by The Federated American Engineering Societies and is now known as the Employment Service of that organization. It is co-operating with engineering organizations in all parts of the country and is desirous of increasing such co-operation by working with local engineering associations and clubs. Members of the American Society of Civil Engineers who desire to register should apply for further information, registration forms, etc., to Walter V. Brown, Manager, Engineering Societies Building, 29 West 39th Street, New York City. In order to be included in the list published in *Proceedings*, copy must be received on or before the first Wednesday of each month. All communications should be addressed to Mr. Brown.

EMPLOYMENT BULLETIN

POSITIONS AVAILABLE

YOUNG ENGINEERS with some sales, architectural, or building experience, to learn business, with view to sales work. Application by letter only. Location, New York City. V-448.

GRADUATE CIVIL ENGINEER with marine construction experience, along wharf and

pier lines, for research and office work. Must be man of appearance, capable of meeting people. Knowledge of French, German, Scandinavian, or Dutch desirable. Must also be familiar with the destruction of piling and piers by the *teredo limonia*, etc. Application by letter. Location, New York City. V-696.

MEN AVAILABLE

PATENT ENGINEER, M. E. and E. E., age 42, married. Registered Attorney of twenty years' standing. Specialist in mechanical movements, desires connection on part time with a corporation to take charge of organization of Patent Department. Location, Metropolitan District. CE-324.

GRADUATE ENGINEER. Three years' experience in manufacturing and selling steel products. Position anywhere in United States. CE-325.

CIVIL ENGINEER AND CONSTRUCTION SUPERINTENDENT, age 35. Twelve years' field experience in construction of industrial buildings, construction and repair of open-hearth and heating furnaces, and plant maintenance and repairs in steel plant. Last employed as Resident Engineer for prominent architect and engineer. Has successfully handled large force of men. CE-326.

CIVIL ENGINEER, Assoc. M. Am. Soc. C. E., age 40, married. Seventeen years' experience in miscellaneous engineering and construction work, including designs, heavy earthwork, railroad yards and buildings, etc. Extensive steam and electric railway valuation and maintenance. Now employed in executive position with large utility property. Desires change. Will consider position with railway, industry or contractor. Personal interview solicited. CE-327.

CIVIL-MECHANICAL SUPERVISING ENGINEER, Assoc. M. Am. Soc. C. E., age 35. Well varied experience in power, hydraulic, and industrial work, both engineering and

construction. Record of responsible and executive connections with well-known organizations; thorough business training. Experience throughout the country; now in Chicago District. CE-328.

FIELD ENGINEER, Assoc. M. Am. Soc. C. E., C. E. Degree 1913, age 38. Eight years' experience on location and construction, covering concrete shipbuilding, hydro-electric power development, irrigation, railroad, and highway work. CE-329.

CIVIL ENGINEER of many years' practical experience, thoroughly acquainted with Australia, desires to take on agencies for American firms. Now located in Sydney. CE-330.

GRADUATE CIVIL ENGINEER AND CONSTRUCTION SUPERINTENDENT, Assoc. M. Am. Soc. C. E., age 34, degree 1908. Twelve years' experience on roads, bridges, surveys, sewers, water-works, and concrete industrial buildings. Experience includes design, inspection, and superintendence. Two years in charge of war work for Construction Division, U. S. A. Available at once. Location immaterial. CE-331.

CIVIL AND MECHANICAL ENGINEER, Assoc. M. Am. Soc. C. E., married, experienced in water supply, filtration, pumping engine design, pumping and power plant design, hydraulic work in general, and engineering sales work, is open for engagement. Twelve years' experience, the past two years in the Orient. Prefers to remain in the United States, but will consider a foreign proposition. Minimum salary, \$5 000. CE-332.

ANNOUNCEMENTS

The Reading Room of the Society is open from 9 A. M. to 6 P. M., and from 7 P. M. to 10 P. M., every day, except Sundays, New Year's Day, Washington's Birthday, Memorial Day, Fourth of July, Labor Day, Thanksgiving Day, and Christmas Day; during July and August, it is closed at 6 P. M.

PROGRAM FOR MONTHLY SOCIETY MEETINGS

The Publication Committee announces the following program covering the monthly meetings up to the summer recess. In each case, the meetings will be held on the Fifth Floor of the Engineering Societies Building, 33 West 39th St., New York City, at 8 P. M., on the days noted.

May 3d, 1922.—A regular monthly business meeting will be held, at which a paper by Arthur T. Safford, M. Am. Soc. C. E., and Edward Pierce Hamilton, Esq., entitled "The American Mixed-Flow Turbine and Its Setting", will be presented by Mr. Safford for discussion.

This paper is printed in this number of *Proceedings*.

June 7th, 1922.—Informal discussion on "Tentative Specifications for Steel Railway Bridges", submitted as a Progress Report of the Special Committee on Specifications for Bridge Design and Construction, and published in the December, 1921, *Proceedings*.

Discussion on this Report is printed in this number of *Proceedings*.

ANNUAL CONVENTION

The Fifty-second Annual Convention of the Society will be held at the Hotel Wentworth, Portsmouth, N. H., on June 21st and 22d, 1922.

BADGES FOR JUNIORS AND STUDENTS

After May 1st, 1922, badges will be issued to Juniors and Students. Juniors and Secretaries of Student Chapters will be notified by letter of style and price.

SCHOLARSHIP IN CIVIL ENGINEERING AT COLUMBIA UNIVERSITY

The governing bodies of Columbia University have placed at the disposal of the Society, a scholarship in Civil Engineering in the Schools of Mines, Engineering and Chemistry of Columbia University, beginning with the academic year 1922-23 and continuing until further notice. The scholarship pays \$350 toward the annual tuition fees, which vary from \$340 to \$360, according to the details of the course selected. Re-appointment of the student to the scholarship for the completion of his course is conditioned upon the maintenance of a good standing in his work.

To be eligible for the scholarship, the candidate recommended will have to meet the regular admission requirements, in regard to which full information will be sent without charge upon application to the Secretary of the University or to the Secretary of the Society.

In a letter addressed to the Secretary of the Society, an applicant for this scholarship should set forth his qualifications (age, place of birth, education, statement of any other activities, such as athletics or working way through

college, references, and photograph). A committee composed of Messrs. Robert Ridgway, C. W. Hudson, and J. P. H. Perry will consider the applications and will notify the authorities of Columbia University of their selection of a candidate. The last day for the filing of applications will be July 1st of each year.

The course at the Columbia Schools of Mines, Engineering and Chemistry is three years in length and is on a graduate basis. A candidate for admission must have had a general education, including considerable work in mathematics, physics, and chemistry. Three years of preparatory work in a good college or scientific school should be sufficient, if special attention has been given to the three preparatory subjects mentioned. A college graduate, with a Bachelor of Science degree in engineering, can generally qualify to advantage. The candidate is admitted on the basis of his previous collegiate record, and without undergoing special examinations. Other qualifications being equal, members of Student Chapters of the Society will be given preference.

The purpose of this advanced course is to produce a high type of engineer, trained in the humanities as well as in the fundamentals of his profession. It is hoped that members will show a keen interest in this scholarship, which will insure the choice of a candidate of the highest qualifications.

LOCAL SECTIONS OF THE AMERICAN SOCIETY OF CIVIL ENGINEERS

San Francisco Section (Constitution Approved by Board, 1905).

Thomas H. Means, President; H. D. Dewell, Secretary-Treasurer, 503 Market Street, San Francisco, Cal.

Colorado Section (Constitution Approved by Board, 1909).

A. N. Miller, President; Thomas H. Olds, Secretary-Treasurer, First National Bank Building, Denver, Colo.

Atlanta Section (Constitution Approved by Board, 1912).

William C. Spiker, President; Frederick H. McDonald, Secretary-Treasurer, 1530 Healy Building, Atlanta, Ga.

Baltimore Section (Constitution Approved by Board, 1914).

Ezra B. Whitman, President; George S. Robertson, Sr., Secretary-Treasurer, 1628 Linden Avenue, Baltimore, Md.

Buffalo Section (Constitution Approved by Board, 1921).

Walter McCulloh, President; John H. Feigel, Secretary-Treasurer, 492 Minnesota Ave., Buffalo, N. Y.

Central Ohio Section (Constitution Approved by Board, 1921).

F. H. Eno, President; H. F. Schryver, Secretary, 405 New York Central Building, Columbus, Ohio.

Cincinnati Section (Constitution Approved by Board, 1920).

Edgar Dow Gilman, President; Alphonse M. Westenhoff, Secretary, 709 Gwynne Bldg., Cincinnati, Ohio.

Cleveland Section (Constitution Approved by Board, 1915).

A. V. Ruggles, President; George H. Tinker, Secretary-Treasurer, 516 Columbia Building, Cleveland, Ohio.

Connecticut Section (Constitution Approved by Board, 1919).

William J. Backes, President; Clarence M. Blair, Secretary-Treasurer, 785 Edgewood Avenue, New Haven, Conn.

Dayton Section (Constitution Approved by Board, 1922).

Charles H. Paul, President; K. C. Grant, Secretary-Treasurer, Winters Bank Building, Dayton, Ohio.

Detroit Section (Constitution Approved by Board, 1916).

H. H. Esselstyn, President; Alex. Linn Trout, Secretary-Treasurer, 110 North Ingalls Street, Ann Arbor, Mich.

District of Columbia Section (Constitution Approved by Board, 1916).

Gratz B. Strickler, President; James H. Van Wagenen, Secretary-Treasurer, 2001 Sixteenth Street, N. W., Washington, D. C.

Duluth Section (Constitution Approved by Board, 1917).

John L. Pickles, President; Walter G. Zimmermann, Secretary, 203 Wolvin Building, Duluth, Minn.

Illinois Section (Constitution Approved by Board, 1916).

A. J. Hammond, President; W. D. Gerber, Secretary-Treasurer, 913 Chamber of Commerce, Chicago, Ill.

Iowa Section (Constitution Approved by Board, 1920).

J. H. Dunlap, President; R. W. Crum, Secretary, Care, Iowa State Highway Commission, Ames, Iowa.

Kansas City (Mo.) Section (Constitution Approved by Board, 1921).

John V. Hanna, President; Henry C. Tammen, Secretary-Treasurer, 1012 Baltimore Avenue, Kansas City, Mo.

Kansas Section (Constitution Approved by Board, 1920).

L. E. Conrad, President; Frank S. Altman, Secretary-Treasurer, 1114 Garfield Avenue, Topeka, Kans.

Los Angeles Section (Constitution Approved by Board, 1913).

Ralph J. Reed, President; Floyd G. Dessery, Secretary, 618 Central Building, Los Angeles, Cal.

Louisiana Section (Constitution Approved by Board, 1914).

Ole K. Olsen, President; F. A. Muth, Secretary, 224 Custom House Building, New Orleans, La.

Nashville Section (Constitution Approved by Board, 1921).

B. H. Klyce, President; L. C. Anderson, Secretary-Treasurer, Bridge Building, Nashville, Tenn.

Nebraska Section (Constitution Approved by Board, 1917).

William Grant, President; Homer V. Knouse, Secretary-Treasurer, 200 City Hall, Omaha, Nebr.

New York Section (Constitution Approved by Board, 1920).

Nelson P. Lewis, President; J. P. J. Williams, Secretary, 33 West 39th Street, New York City.

Northeastern Section (Constitution Approved by Board, 1921).

Frank B. Sanborn, Chairman; Charles W. Banks, Secretary, Wentworth Institute, Boston, Mass.

Northwestern Section (Constitution Approved by Board, 1914).

Charles L. Pillsbury, President; Paul C. Gauger, Secretary, 945 Osceola Avenue, St. Paul, Minn.

Oklahoma Section (Constitution Approved by Board, 1920).

Max L. Cunningham, President; R. E. Brownell, Secretary-Treasurer, 402 First National Bank Building, Oklahoma, Okla.

Philadelphia Section (Constitution Approved by Board, 1918).

Benjamin Franklin, President; S. C. Hollister, Secretary, 1200 Land Title Building, Philadelphia, Pa.

Pittsburgh Section (Constitution Approved by Board, 1918).

J. N. Chester, President; Nathan Schein, Secretary-Treasurer, 1510 Carson Street, Pittsburgh, Pa.

Portland (Ore.) Section (Constitution Approved by Board, 1913).

F. M. Randlett, President; C. P. Keyser, Secretary, 318 City Hall, Portland, Ore.

Providence (R. I.) Section (Constitution Approved by Board, 1920).

Sydney Wilmot, Chairman; Robert L. Bowen, Secretary-Treasurer, 26 Sycamore Street, Providence, R. I.

St. Louis Section (Constitution Approved by Board, 1914).

E. B. Fay, President; William C. E. Becker, Secretary-Treasurer, 426 City Hall, St. Louis, Mo.

San Diego Section (Constitution Approved by Board, 1915).

F. J. Grumm, President; J. Y. Jewett, Secretary-Treasurer, Administration Building, Balboa Park, San Diego, Cal.

Seattle Section (Constitution Approved by Board, 1913).

F. F. Sinks, President; Frank H. Fowler, Secretary-Treasurer, 1319 L. C. Smith Building, Seattle, Wash.

Spokane Section (Constitution Approved by Board, 1914).

C. A. Burnette, President; Charles E. Davis, Secretary-Treasurer, 401 City Hall, Spokane, Wash.

Texas Section (Constitution Approved by Board, 1913).

E. B. Cushing, President; E. N. Noyes, Secretary, 1107 Dallas County Bank Building, Dallas, Tex.

Utah Section (Constitution Approved by Board, 1916).

W. R. Armstrong, President; H. S. Kleinschmidt, Secretary-Treasurer, 222 Felt Building, Salt Lake City, Utah.

Virginia Section (Constitution Approved by Board, 1922).

J. C. Carpenter, President; James F. MacTier, Secretary-Treasurer, 1312 Maple Avenue, Roanoke, Va.

**STUDENT CHAPTERS OF THE
AMERICAN SOCIETY OF CIVIL ENGINEERS***

Stanford University.

R. I. Hill, President; John H. Colton, Corresponding Secretary, Box 121, Stanford, Cal.

* By a recent ruling of the Board of Direction, the minimum membership of a Student Chapter has been fixed at 12 instead of 20.

Alabama Polytechnic Institute.

R. O. Davis, President; A. R. Harvey, Jr., Secretary-Treasurer, Box 661, Auburn, Ala.

Braune Civil Engineering Society (University of Cincinnati).

John W. Guilday, President; C. A. Harrell, Secretary of Section 10; R. Blickensderfer, Secretary of Section 20; University of Cincinnati, Cincinnati, Ohio.

Bucknell University.

Ralph F. Hartz, President; Donald A. Davis, Secretary, Bucknell University, Lewisburg, Pa.

California Institute of Technology.

W. M. Taggart, President; Douglas A. Stromsoe, Secretary, California Institute of Technology, Pasadena, Cal.

Carnegie Institute of Technology.

H. T. Ward, President; J. K. Elliott, Secretary, Carnegie Institute of Technology, Pittsburgh, Pa.

Clemson Agricultural and Mechanical College of South Carolina.

J. H. Baumann, President; W. J. Stribling, Secretary, Clemson Agricultural and Mechanical College of South Carolina, Clemson College, S. C.

Cornell University.

James Hannigan, President; Albert Lucas, Secretary-Treasurer, Lincoln Hall, Cornell University, Ithaca, N. Y.

Drexel Institute.

C. V. Nishwitz, Chairman; Raymond Radbill, Secretary, Drexel Institute, Philadelphia, Pa.

Georgia School of Technology.

F. H. Harrison, President; C. M. Kennedy, Jr., Secretary, 91 West North Avenue, Atlanta, Ga.

Iowa State College.

Raymond L. Whannel, President; C. La Verne Day, Secretary, Iowa State College, Ames, Iowa.

Johns Hopkins University.

W. A. Randall, President; I. M. Zeskind, Secretary, Johns Hopkins University, Baltimore, Md.

Lafayette College.

Douglas M. Brown, President; Ivan C. Blickenstaff, Secretary, Lafayette College, Easton, Pa.

Lehigh University

John N. Marshall, President; George R. Swinton, Lehigh University, Bethlehem, Pa.

Massachusetts Institute of Technology

D. H. McCreery, President; T. S. Wray, Secretary, Massachusetts Institute of Technology, Cambridge, Mass.

Montana State College.

Merrill J. Alquist, President; Emmett Moore, Secretary, 921 South Third Avenue, Bozeman, Mont.

New York University.

George H. Martin, President; Abram J. Jacobs, Secretary, 302 Gould Hall, New York University, New York City.

Norwich University.

Allen J. Hamilton, Secretary, Norwich University, Northfield, Vt.

Ohio State University.

O. W. Merrell, President; William M. Ruddicks, Secretary, 65 Thirteenth Avenue, Columbus, Ohio.

Oregon State Agricultural College.

Richard D. Slater, President; Wilbur H. Welch, Secretary, Oregon State Agricultural College, Corvallis, Ore.

Pennsylvania State College.

Arthur H. McFadden, President; William W. Seltzer, Secretary, Pennsylvania State College, State College, Pa.

Polytechnic Institute of Brooklyn.

W. C. Hanning, President; S. Lordi, Secretary, Polytechnic Institute of Brooklyn, Brooklyn, N. Y.

Purdue University.

R. O. Edwards, President; W. C. Mason, Secretary-Treasurer, Purdue University, West Lafayette, Ind.

Rensselaer Polytechnic Institute.

William Minot Thomas, President; Earl D. Hopkins, Secretary, 147 Eighth Street, Troy, N. Y.

Rose Polytechnic Institute.

Robert Cash, President; F. Ray Martin, Secretary-Treasurer, Rose Polytechnic Institute, Terre Haute, Ind.

Rutgers College.

L. C. Kuhl, President; A. C. Ely, Secretary, 105 Winants Hall, Rutgers College, New Brunswick, N. J.

State University of Iowa.

James Fred Phillips, President; Louis E. Baggs, Secretary, State University of Iowa, Iowa City, Iowa.

Swarthmore College.

Frank Lemke, President; H. Chandee Turner, Jr., Secretary, Swarthmore College, Swarthmore, Pa.

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University of Illinois.

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University of Kansas.

W. W. Hoagland, President; Waldo G. Bowman, Secretary, 1106 Ohio Street, Lawrence, Kans.

University of Kentucky.

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University of Minnesota.

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Jack A. Gunn, Secretary and Treasurer, Box 428, University, Va.

University of Washington.

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University of Wisconsin.

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Virginia Military Institute.

Benjamin F. Parrott, President; R. G. Hunt, Secretary-Treasurer, Virginia Military Institute, Lexington, Va.

Virginia Polytechnic Institute.

W. S. Miles, President; J. Byron Herring, Secretary, Virginia Polytechnic Institute, Blacksburg, Va.

Washington University Collimation Club.

William D. Rolfe, President; Erwin Bloss, Secretary, Washington University, St. Louis, Mo.

West Virginia University.

J. E. Wheeler, President; Milton Jarrell, Secretary, 113 Beverely Avenue, Morgantown, W. Va.

Worcester Polytechnic Institute.

Albert P. Haydon, Secretary, Worcester Polytechnic Institute, Worcester, Mass.

Yale University.

W. S. Moore, President; T. T. McCrosky, Secretary, Sheffield Scientific School, Yale University, New Haven, Conn.

NEW BOOKS*

(From March 1st to March 31st, 1922)

The statements made in these notices are taken from the books themselves, and this Society is not responsible for them.

DONATIONS TO ENGINEERING SOCIETIES LIBRARY

ECONOMICS OF ELECTRICAL DISTRIBUTION.

By P. O. Reyneau and H. P. Seelye. N. Y. and Lond., McGraw-Hill Book Co., Inc., 1922. 209 pp., charts, 9 x 6 in., cloth. \$2.50.

In designing, constructing, or operating an electrical distribution system, the object is to provide all customers with good service at the least possible cost over the system as a whole. This result can be attained only by a careful application of economic principles to all parts of the system. This book defines these principles and indicates methods for their application. Attention is called to the need for economic study in design, the fundamental principles are explained, the usual types of problems are indicated, and methods of studying them offered.

COURSE IN ELECTRICAL ENGINEERING;

Vol. 2. Alternating Currents. By Chester L. Dawes. (Electrical Engineering Texts.) N. Y. and Lond., McGraw-Hill Book Co., Inc., 1922. 526 pp., illus., 8 x 6 in., cloth. \$4.00.

An elementary textbook, intended as an introduction to more advanced books. Prepared for students who have such a knowledge of direct currents as is given by Vol. 1 of this work, but with no previous study of alternating currents.

ELECTRIC SHIP PROPULSION.

By S. M. Robinson. N. Y., Simmons-Boardman Publishing Co., 1922. 274 pp., illus., diagrams, 9 x 6 in., cloth. \$6.00.

This volume treats of the special questions relating to steam turbines, electric generators, induction motors, and other machines, which arise in connection with the propulsion of ships by electricity, and compares this method with others. The various systems are explained and compared. The installations on several ships of the Navy and on the *Wulsty Castle*, which illustrate the application of various systems, are described in detail.

ELECTRIC ARC WELDING.

By E. Wanamaker and H. R. Pennington. N. Y., Simmons-Boardman Publishing Co., 1921. 254 pp., illus., 9 x 6 in., \$4.00.

This manual is based largely on a series of articles published in the *Railway Electrical Engineer*. It contains a large amount of practical information on many phases of the subject; descriptions of systems and their installation, phenomena of metallic and carbon welding arcs, training of welders, sequence of metal deposition for various types of joints and building-up operations, electrodes, thermal disturbances due to welding, properties of welds, efficiency of equipments, and costs. The book is confined to autogenous arc welding.

DYNAMIC AND STATIC BALANCING.

By Edward K. Hammond. N. Y., Industrial Press; Lond., Machinery Publishing Co., Ltd., 1921. 58 pp., illus., 8 x 6 in., paper. 50 cents.

A discussion of the principles of balancing, with a description of machines and methods, written in simple language. As the book is intended for shopmen, the author has avoided mathematical theory.

QUESTIONS AND ANSWERS RELATING TO DIESEL, SEMI-DIESEL,

And Other Internal Combustion Engines, Air Compressors, etc. By John Lamb. Lond., Charles Griffin & Co., Inc.; Phila., J. B. Lippincott Co., 1922. 209 pp., 4 x 5 in., cloth. 5 shillings.

A small pocketbook of practical information for steam engineers and others preparing for license examinations.

* Unless otherwise specified, books in this list have been donated by the publishers.

OPERATING ENGINEER'S CATECHISM OF STEAM ENGINEERING.

By Michael H. Gornston. N. Y., D. Van Nostrand Co., 1922. 428 pp., diagrams, 8 x 5 in., fabrikoid. \$4.00.

An elementary textbook on the construction and operation of boilers, steam engines, and turbines, heating apparatus and pumping machinery, prepared for operating engineers. The text covers the problems that confront the engineer with unusual fullness and is well indexed. The volume should be of assistance to those preparing for examination and as a pocket reference book.

JIGS AND FIXTURES.

By Albert A. Dowd and Frank W. Curtis. (Tool Engineering.) N. Y. and Lond., McGraw-Hill Book Co., Inc., 1922. 293 pp., diagrams, 9 x 6 in., cloth. \$2.50.

This book, the first of three on the principles underlying the design of production tools, deals with the design of jigs and fixtures for drilling, indexing, milling, profiling, broaching, riveting, etc. A chapter is devoted to vises and vise fixtures. The work deals with principles, although many interesting fixtures are shown to illustrate their use. The important points connected with the design and the relative desirability of various designs are discussed.

MODERN GASWORKS PRACTICE.

By Alwyne Meade. Second Edition. Lond., Benn Brothers, Limited, 1921. 815 pp., illus., diagrams, 10 x 7 in., cloth. 55 shillings.

The first edition of this book appeared in 1917 and quickly became out of print, through the immediate recognition of its worth as the most complete, authoritative account of modern practice extant. The new edition, although retaining all the merits of the first, has undergone an increase in bulk of 50%, through the addition of new matter, and has also been largely rewritten, to take account of the upheaval in the technique of gas-works practice in England, caused by the substitution of a calorific standard for the former candle-power standard. Every phase of the works side of gas engineering is covered, from the planning and construction of gasworks to the storage of the gas and recovery of the by-products. As a general work of reference, the book is of the greatest value to all engaged in the gas industry.

DISTRIBUTION OF GAS.

By Walter Hole. Fourth Edition. Lond., Benn Brothers, Limited, 1921. 699 pp., illus., diagrams, 10 x 7 in., cloth. 50 shillings.

This book is uniform in size with Mead's "Modern Gasworks Practice", to which it forms a fitting companion. That work treats of gas manufacture, this takes up the account at the gasholder and discusses the distribution to the consumers' appliances. The scope of the volume is a wide one. The opening chapter discusses the rights and duties of gas undertakings. Succeeding chapters treat of discharges from pipes, station governors, districting, pipes and joints of iron and steel, main-laying, valves and cocks, conduits, service pipes, meters, internal fitting, internal lighting, gas stoves and heaters, gas engines, industrial uses of gas, pressures, complaints and repairs, street lighting, high-pressure distribution, high-pressure lighting and heating, leakage, electrolysis, and fusion. The information given is thoroughly representative of current practice. Obsolete matter has been deleted in preparing this new edition and much that is new has been added.

PRACTICAL CHEMISTRY OF COAL AND ITS PRODUCTS.

By A. E. Findley and R. Wigginton. London, Benn Brothers, Limited, 1921. 144 pp., diagrams, tab., 9 x 6 in., cloth. 12 shillings 6 pence.

A collection of reliable methods for analyzing coal, coke, ammonia liquor, benzene, coal tar, water, gas, and similar products and raw materials of the gas and coke industries. Based on the course in fuel technology at Sheffield University.

GRUNDLAGEN DER FLUGTECHNIK.

By H. G. Bader. Leipzig, B. G. Teubner, 1920. 194 pp., 9 x 6 in., paper. \$2.90.

A work for designers of airplanes, dealing with the calculations required and the proper methods and formulas. The text covers all the calculations that are needed in practical design and illustrate their use by application to the calculation of a concrete example. The book contains a brief bibliography.

VERVOLLKOMMUNG DER KRAFTFAHRZEUGMOTOREN DURCH LEICHTMETALLKOLBEN.

By Gabriel Becker. München, R. Oldenbourg, 1922. 97 pp., illus., 11 x 7 in., paper. 75 marks.

The first section of this work discusses the possibilities for improving automobile construction by reducing wind resistance and weight, increasing the size and efficiency of the engines, or by perfecting the engines thermodynamically and structurally. The second and longer section gives the results of an interesting series of tests on light metal pistons, made

in 1921 at the Automobile Testing Laboratory of the Berlin Technical High School, under the direction of the author, with the assistance of the German Engine Manufacturers' Association. Extensive tests of 16 different aluminum and magnesium alloy pistons are presented and compared with tests of cast-iron and pure copper pistons.

GIESSEREI-HANDBUCH.

Herausgegeben vom Verein Deutscher Eisengiessereien Giessereiverband in Düsseldorf. München, R. Oldenbourg, 1922. 264 pp., tab., 10 x 7 in., cloth. 300 marks.

This handbook has been prepared by the German Ironfounders' Association as a convenient compendium of data used by foundrymen. It includes the standards adopted by many European railroads, by associations, and societies, methods for the analysis of cast iron, coal, coke, slags and flue gases, physical data for iron and other materials, the German standards for cast-iron pipe, tariff, and statistical data concerning the trade, trade associations, and directors of German foundries, and foundry supply dealers.

TEXTBOOK OF FIRE ASSAYING.

By Edward E. Bugbee. N. Y., John Wiley & Sons, Inc.; Lond., Chapman & Hall, Ltd., 1922. 254 pp., illus., 9 x 6 in., cloth.

This work is based on the course at the Massachusetts Institute of Technology and is intended as a college textbook; but will also be useful, the author hopes, to more mature students. An endeavor has been made to give the scientific reasons underlying the phenomena that occur and the rationale of the processes and manipulations, and to avoid the character of a mere receipt book.

PROBENAHME UND ANALYSE VON EISEN UND STAHL.

By O. Bauer and E. Deiss. Zweite Auflage. Berlin, Julius Springer, 1922. 304 pp., illus., 10 x 7 in., cloth. 472 marks.

This work presents methods for sampling and analyzing iron and steel adopted by the authors for their work at the National Testing Laboratory in Berlin. The first section, by Prof. Bauer, discusses sampling, emphasizes the importance of proper sampling, and gives much information on proper methods of taking, polishing, and etching samples for microscopic examination. The metallographic characteristics of the constituents of iron and steel are described and directions given for securing representative samples of iron and steel for examination. The second section, by Prof. Deiss, gives reliable methods for the accurate chemical determination of the various constituents of iron and steel. This edition has been carefully revised and enlarged.

TEXTBOOK OF MINERALOGY.

By Edward Salisbury Dana. Third Edition, Revised and Enlarged by W. E. Ford. N. Y., John Wiley & Sons, Inc.; Lond., Chapman & Hall, Ltd., 1922. 720 pp., illus., 9 x 6 in., cloth. \$5.00.

It is twenty-four years since the second edition of this work appeared. The changes involved in the present edition are chiefly those of addition, the general character and form of the book remaining unchanged. The methods used in the stereographic and gnomonic projections have been introduced into the section on Crystallography. The section on the Optical Characters of Minerals has been rewritten. All new species have been briefly mentioned in their proper places in the section on Descriptive Mineralogy. The book endeavors to present, clearly and concisely, all the information needed by students of the science.

PETROLEUM.

By Sir Boerton Redwood. Fourth Edition. Lond., Charles Griffin & Co., Ltd.; Phila., J. B. Lipincott Co., 1922. 3 v., maps, pl., illus., tab., 9 x 6 in., cloth. \$21.00.

The present edition of this work was in preparation when the author died, in 1919, and certain portions had received his final revision. The remaining portions have been revised by his friends, and the work has been seen through the press by A. W. Eastlake and Robert Redwood. The general plan of previous editions is retained, although the entire work has been reset. Commencing with an historical account of the industry, the distribution, physical and chemical properties, and origin of petroleum are discussed in Vol. 1. Vol. 2 is devoted to production, refining, transportation, storage, and distribution, and to the shale oil industry. Vol. 3 treats of testing, uses, and laws; it also contains statistics, import duties, and an extensive bibliography. This contains nearly nine thousand references; unfortunately, it seems to include few, if any, publications later than 1911.

ZIRCONIUM AND ITS COMPOUNDS.

By Francis P. Venable. (American Chemical Society: Monograph Series.) N. Y., Chemical Catalog Co., Inc., 1922. 173 pp., 9 x 6 in., cloth. \$2.50.

This work contains a concise account of present knowledge of the chemistry of zirconium and its compounds with other elements. Methods for the analysis of zirconium compounds, and chapters on technical applications and patents are included. An extensive bibliography is given.

THE VITAMINS.

By H. C. Sherman and S. L. Smith. (American Chemical Society: Monograph Series.) N. Y., Chemical Catalog Co., Inc., 1922. 273 pp., pl., 9 x 6 in., cloth. \$4.00.

This book discusses an important branch of food chemistry, the properties and nature of the vitamins. The chemical and physiological properties of the three generally recognized vitamins are thoroughly discussed, and a chapter is devoted to the place of the vitamins in the practical problem of providing an adequate, economical food supply. An extensive bibliography is included.

IONS, ELECTRONS, AND IONIZING RADIATIONS.

By James Arnold Crowther. Third Edition. N. Y., Longmans, Green & Co.; Lond., Edward Arnold, 1922. 292 pp., diagrams, 9 x 6 in., cloth. \$4.00.

This edition has been thoroughly revised, and new matter has been added wherever necessary. It now includes the results of recent work on constants, a fuller account of positive rays, and an account of the nuclear theory of the atom. The book is intended to be a reasonably complete account of the present state of the subject, suitable for students who wish a systematic knowledge of the late developments in physics.

AGGREGATION AND FLOW OF SOLIDS.

By Sir George Beilby. Lond., Macmillan and Co., Ltd., 1921. 256 pp., pl., 9 x 6 in., cloth. 20 shillings.

The molecular structure and physical properties of matter in the solid state have engaged the author's attention for many years, and from time to time papers embodying the results from particular researches have been published. The entire series of investigations has now been collected and sifted, and the results appear in the present volumes as a consecutive whole. The book is an interesting record of actual experimental observations, many of which have important industrial applications, and a summary of the conclusions reached by the author as to the meaning of the phenomena observed. A large number of excellent photo-micrographs are included.

COMPREHENSIVE TREATISE ON INORGANIC AND THEORETICAL CHEMISTRY.

By J. W. Mellor. Vol. 1-2. Lond. and N. Y., Longmans, Green and Co., 1922. 2 v., illus., 10 x 6 in., cloth.

This treatise aims, when completed, to give a complete description of all the compounds known in inorganic chemistry and, where possible, to discuss them in the light of physical chemistry. Vol. 1 is mainly introductory. It treats of the evolution and methodology of chemistry, of chemical combination, atoms, molecules, and hydrogen and oxygen and their compounds. The second volume includes the halogens, the alkali metals and the ammonium compounds. Subjects are treated with great fullness, and authorities are given for all statements of fact. The references to original publications are very complete. The work fills an important gap in modern chemical literature and will be a necessity, not only to chemists, but to workers in the various chemical and metallurgical industries who have use for precise data concerning chemical elements and compounds. No work of similar character and completeness exists in the English language.

INTRODUCTION TO PHYSICAL CHEMISTRY.

By Sir James Walker. Ninth Edition. Lond., Macmillan and Co., Ltd., 1922. 438 pp., illus., 9 x 6 in., cloth. \$4.50. (Gift of The Macmillan Co., N. Y.).

Intended for the student with some knowledge of chemistry and physics, who wishes a work that will effect a connection between the knowledge which he possesses and the works on physical chemistry. By selecting certain chapters of physical chemistry and treating the subjects contained in them at some length, with a constant view to their practical application, this book is arranged to serve as an explanatory introduction. The present edition is revised and partly rewritten.

REAL MATHEMATICS.

By Ernest G. Beck. (Oxford Technical Publications.) Lond., Henry Frowde and Hodder & Stoughton, 1922. 306 pp., diagrams, 8 x 5 in., cloth. 15 shillings. (Gift of Oxford University Press, American Branch.)

This book is intended to assist in the acquisition of a real, serviceable, sound mathematical equipment, by augmenting standard textbooks and orthodox methods of study. The author hopes it will contribute toward the adoption of a change of attitude toward mathematics by those who require it as a part of their working equipment, by showing it as an actual, tangible reality, instead of a collection of rigid and unrelated rules and formulas. The method given assists the student to visualize the various operations and processes used in mathematical calculation.

MATHEMATICAL PHILOSOPHY.

By Cassius J. Keyser. N. Y., E. P. Dutton & Co., 1922. 466 pp., 8 x 6 in., cloth. \$4.70.

This course of lectures by the Adrian Professor of Mathematics at Columbia University aims to disclose fundamental connections between mathematics and philosophy. The author attempts to give an insight into the essential nature of mathematics regarded as a distinctive type of thought, to show what is characteristic and fundamental in mathematical method, acquaint readers with those of the great mathematical concepts that are available to laymen, and thus to give an understanding of mathematics in relation to the other sciences and arts.

ELEMENTS OF THE DIFFERENTIAL AND INTEGRAL CALCULUS.

By William S. Hall. Second Edition, Revised. N. Y., D. Van Nostrand Co., 1922. 250 pp., 9 x 6 in., cloth. \$2.75.

This textbook is an endeavor to present the calculus and some of its important applications simply and concisely, yet fully enough to make possible the study of subjects that call for knowledge of it. In this new edition, Chapters 1, 4, and 5 have been rewritten, other revisions have been made, and many new problems added.

FACTORY ADMINISTRATION IN PRACTICE.

By W. J. Hiscox. Lond. and N. Y., Sir Isaac Pitman & Sons, Ltd., 1921. 214 pp., 9 x 6 in., cloth. \$2.50.

Most of the books on factory administration seem to have been written by accountants for accountants, the author thinks, and, as a consequence, have disregarded factory conditions to some extent. The present work is written from the factory viewpoint, and is intended for the works manager, the foreman, and all members of the factory administrative staff. The views and schemes set forth are the results of sixteen years' practical experience with engineering firms in Great Britain. Special prominence is given to the progress system.

MANUAL OF STANDARD PRACTICE FOR THE POWER LAUNDRY WASHROOM.

By the Industrial Fellowship of the Laundryowners National Association. La Salle, Ill., Laundryowners National Assoc., 1922. 112 pp., 8 x 5 in., paper. \$1.00.

For several years the Chemical Engineering Department of the Laundryowners National Association has been engaged, in co-operation with the Mellon Institute of Industrial Research, in an investigation of laundry practice. The present volume is a report of the results attained. It presents a clear statement of the best practice in the washroom, gives standard formulas for proper procedure, and discusses the supplies used in the work.

BLUE PRINTING AND MODERN PLAN COPYING.

By B. J. Hall. Lond. and N. Y., Sir Isaac Pitman & Sons, Ltd., 1921. 130 pp., illus., 8 x 5 in., cloth. \$2.00.

This volume should be of interest to engineers who have plans to be copied, to installers of copying plants, and to operators. The first section of the book discusses the capabilities of contact photography and allied processes for copying drawings, as well as the proper preparation of drawings for reproduction. Section two describes the machinery and apparatus used in blue-printing plants. The concluding section deals with the layout of blue-printing rooms and methods of working. Both contact and camera processes are included.

L'ETHER ACTUEL ET SES PRÉCURSEURS.

By E. M. Lémeray. (Actualités Scientifiques.) Paris, Gauthier-Villars et Cie., 1922. 141 pp., 7 x 5 in., paper.

The author of this book, an early student of the investigations of Lorentz and Einstein, is a master of the theories of relativity and has written several summaries of them. In the present work, he traces the development of the idea of the ether, which these theories tend to modify anew. The book is the result of an extensive examination of the history of science. Beginning with the ideas of the Chaldeans and Egyptians concerning a universal spirit, the modifications due to the Greeks and Romans, the ether of Huyghens, phlogiston, caloric, the ether of Fresnel, and that of later students are described.

PRINCIPLES AND DESIGN OF FOUNDATION AIR-BRAKE RIGGING.

N. Y., Air Brake Association, 1921. 121 pp., diagrams, 9 x 6 in., paper.

In the interest of higher air-brake education, the Air Brake Association has secured from the Westinghouse Air Brake Company the right to publish this study of some of the finer points that contribute to the efficiency of air-brakes. The book is the joint product of experienced engineers and should be useful to all users and designers of brakes.

MODERN TUNNELING.

By David W. Brunton and John A. Davis. New Chapters on Railroad Tunneling, by J. Vipond Davies. Second Edition. N. Y., John Wiley & Sons, Inc.; Lond., Chapman & Hall, Ltd., 1922. 612 pp., illus., 9 x 6 in., cloth. \$6.50.

This is apparently a reprint of the first edition, published in 1914, with the important addition of five chapters, comprising 157 pages, written by Mr. Davis. This addition is a notable increase in the size of the book and a most important extension of its scope and usefulness. The original book supplied up-to-date data concerning American tunneling methods and equipment, but was restricted to tunnels and adits for mines and water carriage; that is, tunnels of small size in which the heading was excavated at a single operation. The new matter in this edition deals with large tunnels for railroads and highways, both subterranean and subaqueous. Extensive bibliographies are included.

EARTHWORK IN RAILWAY ENGINEERING.

By John W. F. Gardner. (Glasgow Textbooks.) N. Y., D. Van Nostrand Co., 1922. 152 pp., illus., 9 x 6 in., cloth. \$3.50.

The purpose of this book is to describe briefly, in a practical manner, the underlying principles that control earthwork undertakings, as far as they relate to general railway work. In selecting the matters to be included, the author gives preference to the points more directly affected by the construction work. Special attention is given to questions of drainage.

SANITATION AND SEWAGE DISPOSAL FOR FARMSTEADS AND COUNTRY ESTATES.

By William Paul Gerhard. N. Y., The Author. 12 pp., 9 x 6 in., paper. 30 cents.

In this essay on rural sanitation Dr. Gerhard reviews briefly the defects of customary methods of rural sewage disposal and discusses those that are possible and really sanitary.

FUNDAMENTALS OF ECONOMICAL PLUMBING.

By William Paul Gerhard. N. Y., The Author. 4 pp., 12 x 9 in., paper. 30 cents.

This pamphlet on plumbing, reprinted from the *American Architect*, makes various practical suggestions concerning plumbing materials, fittings, and methods, tending toward economy in plumbing construction.

PLUMBERS' HANDBOOK.

By Samuel Edward Dibble. N. Y. and Lond., McGraw-Hill Book Co., Inc., 1922. 629 pp., illus., 7 x 4 in., fabrikoid. \$4.00.

A concise reference book, of pocket size, which contains practical and theoretical data on matters pertaining to plumbing and heating. The book is intended for plumbers, architects, engineers, contractors, and sheet metal workers.

HEATING AND VENTILATION.

By John R. Allen and J. H. Walker. Second Edition. N. Y. and Lond., McGraw-Hill Book Co., Inc., 1922. 332 pp., illus., diagrams, tables, 9 x 6 in., cloth. \$3.50.

A textbook for use in engineering and architectural schools, intended also for use as a handbook by engineers and architects. A second edition has become desirable, because of the advances in the art made recently, such as the establishment of standards for ventilation and the results obtained in the research laboratory of the American Society of Heating and Ventilating Engineers. The text has been thoroughly revised and enlarged to include recent developments.

ESSENTIALS IN THE THEORY OF FRAMED STRUCTURES.

By Charles A. Ellis. N. Y. and Lond., McGraw-Hill Book Co., Inc., 1922. 330 pp., tab., 9 x 6 in., cloth. \$3.50.

This textbook contains no new principles, but sets forth the fundamental ideas in a different manner from that usually adopted in textbooks. The method is that of procedure from particular cases to general ones. Each principle is introduced by illustrative numerical problems, through the study of which the student is led to develop the general expression. The book requires little use of the calculus.

HYDRAULICS OF PIPE LINES.

By W. F. Durand. (Glasgow Textbooks.) N. Y., D. Van Nostrand Co., 1921. 271 pp., diagrams, 9 x 6 in., cloth. \$4.50.

Intended to give a discussion, in engineering form, of the more important hydraulic problems which arise in connection with pipe lines and pipe-line flow. No attempt is made to treat the subject structurally or descriptively. The successive chapters discuss general hydraulic principles, surge, water ram or shock, stresses in pipe lines, materials, construction, design, and oil pipe lines.

SAN FRANCISCO BAY MARINE PILING SURVEY.

Second Annual Progress Report. San Francisco, The Committee, 1922. 82 pp., pl., 9 x 6 in., paper.

During 1921, the approximate period covered by this report, attention has been directed to compiling service records for existing structures and preparing a standard form for service reports, to studying methods of construction and protection and to a biological study of the destructive agency, *Teredo navalis*. Advice on proper methods of handling and using piling, repairing, creosoting, etc., is given, accompanied by specifications for creosoted piling and lumber.

DONATIONS TO READING ROOM**HYDROELECTRICAL ENGINEERING.**

By Richard Muller. N. Y., G. E. Stechert & Co., 1921. 431 pp., diagrams, pl., 10 x 6½ in., cloth. (Gift of the Author.)

In a secondary title, it is stated that this book is for hydraulic and electrical engineers, students, and others interested in the development of hydro-electric power systems. It comprises in a systematic manner those principles of hydraulic and electrical engineering, which underlie the design of water-power plants. An earnest effort has been made by the author toward a proper selection and arrangement of the subject-matter.

PRACTICAL STRUCTURAL DESIGN.

By Ernest McCullough, M. Am. Soc. C. E. Second Edition, Revised and Enlarged. N. Y., U. P. C. Book Co., Inc., 1921. 317 pp., tab., diagrams, 9 x 6 in., cloth. \$3.00.

This book is intended as a text and reference work on the design of structures for engineers, architects, builders, draftsmen, and technical schools, and is especially adapted to the needs of self-tutored men.

MEMBERSHIP

(From March 1st to April 4th, 1922)

ADDITIONS

MEMBERS	Date of Membership.
BACKUS, RICHARD ALLISON. Engr. of Constr. with McKenzie, Voorhees & Gmelin, 342 Madison Ave., New York City (Res., 45 Prospect St., South Orange, N. J.).....	Nov. 21, 1921
BARSHELL, FREDERICK BAYARD. Engr.; U. S. Shipping Board, Emergency Fleet Corporation, 134 West 116th St., New York City.....	May 1, 1906 April 30, 1912 Nov. 21, 1921
BRIGGS, ROBERT WESLEY. Asst. Engr., Office of Asst. to the Pres., N. Y. C. Lines, 466 Lexington Ave., New York City.....	Assoc. M. M. June 11, 1917 Jan. 20, 1922
CATON, JOHN HIRST, 3d. Director Gen., Bureau of Public Works, Santo Domingo, Dominican Republic.....	Assoc. M. M. June 11, 1917 Jan. 20, 1922
CORRIGAN, GEORGE WASHINGTON. Div. Engr., S. P. Co., 5th and Central Sts., Los Angeles (Res., 1965 Milan Ave., South Pasadena), Calif.....	Jun. Assoc. M. M. Feb. 5, 1901 Oct. 5, 1904 Jan. 20, 1922
JEPPESEN, GUNNI. Structural and Mech. Engr., 2104 Birchwood Ave., Chicago, Ill.....	Nov. 21, 1921
KITTREDGE, FRANK ALVAH. Senior Highway Engr., U. S. Bureau of Public Roads, Mills Bldg., San Francisco, Calif.....	Jun. Assoc. M. M. Mar. 1, 1910 Sept. 3, 1913 Oct. 12, 1921 Sept. 12, 1921
LEWIS, FRANK REDMOND. Cons. Engr., Forney, Tex.....	
PARKER, JOSEPH WARREN. Care, Boston Transit Comm., 1 Beacon St., Boston, Mass.....	Oct. 10, 1921
SLATER, WILLIS APPLEFORD. Engr.-Physicist, Bureau of Standards, Washington, D. C.....	Assoc. M. M. June 24, 1914 Jan. 20, 1922

ASSOCIATE MEMBERS

ADAMS, WILLIAM GEORGE ALEXANDER. With Michigan Ave. Holding Co., Inkster, Mich.....	Jan. 16, 1922
CRADDOCK, ALGERNON CHARLES BRENNAN. Dist. Engr., Public Works Dept., Shanghai Municipal Council, Shanghai, China.	Sept. 12, 1921
FELLOWS, FRED GEORGE. 1674 South Pennsylvania St., Denver, Colo.	Jan. 16, 1922
FOX, HAROLD ROBERT LESLIE. Dist. Engr., Jamaica Govt. Ry., Burlington, St. Margarets Bay, Jamaica.....	Jan. 16, 1922
GRAHAM, RALPH CHASE. Vice-Pres. and Engr., John Benedict Co., Suite 523, Lane Bldg. (Res., 206 Kirkwood Boulevard), Davenport, Iowa.....	Sept. 12, 1921
HUSSON, WILLIAM MORAGNE. Archt. and Engr., 135 Westchester Sq., New York City.....	June 23, 1916 Assoc. M. Mar. 16, 1922
McNOWN, WILLIAM COLEMAN. Associate Prof., Civ. Eng., Univ. of Kansas (Res., 1734 Illinois St.), Lawrence, Kans.....	Sept. 12, 1921
MARTIN, ARTHUR LOUIS LIPPARD. Supt., Frederic P. Kelley, 1116 Forty-ninth St., Brooklyn, N. Y.....	Sept. 12, 1921
MONTGOMERY, ALBERTIS. Lieut., Corps of Engrs., U. S. A., 9th Engrs., Mounted, Fort Riley, Kans. { Jun.	Jan. 6, 1915
	Assoc. M. Jan. 16, 1922

ASSOCIATE MEMBERS—(Continued)

Date of
Membership.

POLLARD, WILLARD AVERELL, JR. Lieut., C. E. C., U. S. N., U. S. Navy Mine Depot, Yorktown, Va.....	Nov. 21, 1921
ROMANOWITZ, CHARLES MILLICHAMP. Sales Engr., Jun. Yuba Mfg. Co., 1448 Page St., Alameda, Calif. Assoc. M.	Dec. 3, 1913
SCHIMMELPFENNIG, CHARLES WILLIAM. Gen. Mgr., Sunlight Coal Co.; Pres., Great Lakes Dredging Co., Boonville, Ind.....	Jan. 16, 1922
TAYLOR, LLOYD WEBB. Box 658, Decatur, Tex.....	Sept. 12, 1921
TU, TINPH WEITSEN. Care, Chinese Representative's Office, Tech- nical Board, Priston, Harbin, Manchuria, China.....	April 3, 1922
VARNER, FULLTON ESPEY. Care, Atlanta Textile Machinery Co., 54 South Forsyth St., Atlanta, Ga.....	April 3, 1922
	Nov. 21, 1921

AFFILIATE

GRANT, DWIGHT ALLEN. Vice-Pres. and Gen. Supt., Mayer-Grant Co., Box 16, Oil City, Pa.....	Jan. 16, 1922
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JUNIORS

DE STAEBLER, HERBERT CONRAD. 2073 Railway Exchange Bldg., St. Louis, Mo.....	Jan. 16, 1922
HENDERSHOT, FRED. 1404 Kimball Bldg., Chicago, Ill.....	Oct. 10, 1921
WIDSTRAND, OSCAR. 511 Seventh Ave., North Troy, N. Y.....	Nov. 21, 1921

DEATHS

BISSELL, FRANK EDWARD. Elected Junior, April 2d, 1884; Member, September 2d, 1891; date of death unknown.
BUSH, HARRY DEAN. Elected Member, May 2d, 1888; died March 15th, 1922.
DEGARMO, ROBERT MAX. Elected Associate Member, November 4th, 1914; died February 14th, 1922.
LAFLER, WILLIAM ARTHUR. Elected Associate Member, May 4th, 1909; died Jan- uary 19th, 1922.
OSBORN, FRANK CHITTENDEN. Elected Member, October 3d, 1888; died January 31st, 1922.
RANDOLPH, LINGAN STROTHER. Elected Member, January 2d, 1890; died March 7th, 1922.
SAVAGE, JOHN RICHARD. Elected Member, June 7th, 1905; died February 25th, 1922.
WHEELER, EDGAR TRUE. Elected Member, December 7th, 1904; died March 2d, 1922.
WOOD, JOSEPH. Elected Member, April 1st, 1874; died March 4th, 1922.

Total Membership of the Society, April 4th, 1922,
10 286.

CURRENT CIVIL ENGINEERING LITERATURE

Note.—The title of this list has been changed from "Monthly List of Recent Engineering Articles of Interest" to that given above. At the same time the number of periodicals indexed has been curtailed. This has been accomplished by excluding all periodicals which are published distinctly in the interest of other branches of engineering. It is the intention to index practically all the articles in the publications listed.

A new form of classification has been adopted, which will be expanded as necessary. The same letters and numbers will always be used to indicate the same classes and subdivisions of classes, and therefore any one wishing to group the articles listed on a certain subject will find them in each Number of Proceedings under the same letter and number.

KEY TO ABBREVIATED REFERENCES TO PUBLICATIONS INDEXED*

Abbreviated References.	Publication.	Place.
Am. C. Inst.....	American Concrete Institute, Proceedings (Y.)	Detroit
A. I. E. E.....	American Institute of Electrical Engineers, Journal (M.)	New York
A. R. E. A.....	American Railway Engineering Association, Proceedings (Y.)	Chicago
A. S. T. M.....	American Society for Testing Materials, Proceedings (Y.)	Philadelphia
Am. Soc. C. E.....	American Society of Civil Engineers, Proceedings (M.)	New York
Am. Soc. Mun. Impvts.....	American Society for Municipal Improvements, Proceedings (Y.)	New York
Am. W. W. Assoc.....	American Waterworks Association, Journal (Bi-M.)	Baltimore
Am. Wood Prs. Assoc.....	American Wood Preservers Association, Proceedings (Y.)	Baltimore
Ann. P. et C.....	Annales des Ponts et Chausées (Bi-M.)	Paris
Ann. T. P. Belg.....	Annales des Travaux Publics de Belgique (Bi-M.)	Brussels
Assoc. Ing. Gand.....	Annales de l'Association des Ingénieurs sortis des Ecoles Spéciales de Gand (Q.)	Ghent
Bost. Soc. C. E.....	Boston Society of Civil Engineers, Journal (M.)	Boston
Can. Engr.....	Canadian Engineer (W.)	Toronto
Cem. Eng.....	Cement and Engineering News (M.)	Chicago
Cornell C. E.....	Cornell Civil Engineer (M.)	Ithaca
Dock & Harbour.....	Dock and Harbour Authority (M.)	London
Eisenbau.....	Der Eisenbau (M.)	Leipzig
Eng.....	Engineering (W.)	London
Eng. Club, St. L.....	Engineers Club, St. Louis, Journal (Bi-M.)	St. Louis
Eng. & Contr.....	Engineering and Contracting (W.)	Chicago
Eng. Inst. Can.....	Engineering Institute of Canada, Journal (M.)	Montreal
Eng. N. R.....	Engineering News-Record (W.)	New York
Engrs. Soc. Pa.....	Engineers' Society of Pennsylvania, Journal (M.)	Harrisburg
Engrs. Soc. W. Pa.....	Engineers' Society of Western Pennsylvania, Journal (M.)	Pittsburgh
Engr.....	Engineer (W.)	London
Engrs. & Eng.....	Engineers and Engineering, Engineers' Club of Philadelphia (M.)	Philadelphia
Gen. Civ.....	Le Génie Civil (W.)	Paris
Gesund. Ing.....	Gesundheits Ingénieur (W.)	Munich
Inst. C. E.....	Institution of Civil Engineers Minutes of Proceedings (Q.)	London
Inst. Mun. & Co. Engrs.....	Institution of Municipal and County Engineers, Journal (W.)	London
Int. Ry. Assoc.....	International Railway Association, Bulletin (M.)	Brussels
Land. Arch.....	Landscape Architecture (M.)	Harrisburg
Mech. Eng.....	Mechanical Engineering (M.) Journal of the American Society of Mechanical Engineers	New York
Mil. Engr.....	Military Engineer (M.)	Washington
Min. & Metal.....	Mining and Metallurgy (M.) American Institute of Mining Engineers	New York
Mun. & Co. Eng.....	Municipal and County Engineering (M.)	Indianapolis
N. E. W. W. Assoc.....	New England Water Works Association, Journal (M.)	Boston
N. Y. R. R. Club.....	New York Railroad Club, Proceedings (M.)	Brooklyn
Oest. Ing. Arch. Ver.....	Oesterreichischer Ingenieur und Architekten Verein, Zeitschrift (W.)	Vienna
Power.....	Power (W.)	New York
Rev. Gen.....	Revue Générale des Chemins de Fer (M.)	Paris

* Y = Yearly; Q = Quarterly; M = Monthly; F = Fortnightly; W = Weekly.

Abbreviated References.

Publication.

Place.

Ry. Age.....	Railway Age (W.)	New York
Ry. Main. Engr.....	Railway Maintenance Engineer (M.)	Chicago
Ry. Rev.....	Railway Review (W.)	Chicago
Schw. Bauz.....	Schweizerische Bauzeitung (W.)	Zurich
Sci. Am.	Scientific American (M.)	New York
Soc. Ing. Civ. Fr.	Société des Ingénieurs Civils de France, Mémoires et Comptes Rendus (Q.)	Paris
Ver. deu. Ing.	Verein deutscher Ingenieure, Zeitschrift (W.)	Berlin
West. Ry. Club.....	Western Railway Club, Proceedings (M.)	Chicago
West. Soc. Engrs.....	Western Society of Engineers, Journal (M.)	Chicago
Zeit. Bau.....	Zeitschrift für Bauwesen (Q.)	Berlin
Z. d. Bauver.	Zentralblatt der Bauverwaltung (Semi-Weekly)	Berlin

A. Applied Sciences

a. Processes of Calculation

3. Stresses and Strains

Abaques pour le Détermination des Taux de Travail dans une Poutre Rectangulaire en Béton Armé, Soumise à la Flexion Composée.* (Graphical Table for the Determination of the Working Stress in a Rectangular Beam of Reinforced Concrete, Subjected to Compound Flexure.) Victor Loup. Gen. Civ. Feb. 18, '22.

B. Applied Mechanics

a. Mechanics of Solids (Strength of Materials)

2. Elastic Solids

The Effect of Temperature on the Modulus of Elasticity and Other Properties of Metals.*

Frederick Charles Lea. Inst. C. E. 1919-20, Pt. 1.

Statically Indeterminate and Non-Articulated Structures.* F. C. Lea. Eng. Serial beginning Mar. 17, '22.

Beitrag zur Berechnung dem kontinuierlichen Träger verwandter Systeme von höherem Grade statischer Unbestimmtheit, unter besonderer Berücksichtigung der Einflussflächen für die Momente.* (Contribution to the Calculation of Systems Related to Continuous Beams, of Higher Degree of Static Indeterminateness, with Special Reference to the Area of Influence for the Moments.) Kaufmann. Eisenbau. Serial beginning July, '21.

Zur Berechnung der Verdrehungsschwingungen von Wellenleitungen.* (Calculation of the Fluctuations in Torque of Shafting.) J. Geiger. Ver. deu. Ing. Nov. 26, '21.

Breitfansche Träger.* (Broad Flanged Beams.) Schaper. Eisenbau. Feb., '22.

Die Kipplast des I-Trägers.* (Tipping Load for I-Beams.) G. Unold. Eisenbau. Feb., '22. Verdrehungsschwingungen von Wellen.* (Torsional Oscillations of Shafts.) O. Föppl. Schw. Bauz. Feb. 4, '22.

3. Jointed Systems

Einige Aufgaben über die Knickfestigkeit elastischer Stabverbindungen.* (Some Problems on the Resistance to Buckling of Elastic Connecting Bars.) Eisenbau. Serial beginning Feb., '22.

Übergang vom reinen Druck zum Knicken.* (Transition from Pure Compression to Flexure.) Z. d. Bauver. Feb. 11, '22.

4. Riveted Systems

Calcul des Poutres à Treillis Double avec Membrures Parallèles et Montants Verticaux sur les Appuis Seulement.* (Calculation of Double Lattice Girders with Parallel Members and Vertical Uprights on the Supports Only.) Léon Legens. Gen. Civ. Jan. 7, '22.

Calcul des Poutres à Treillis Double avec Membrures Parallèles et Montants Verticaux à tous les Nœuds d'Attache.* (Calculation of Double Lattice Girders with Parallel Frames and Vertical Uprights to all the Connecting Points.) Léon Légens. Gen. Civ. Feb. 11, '22.

Über die Berechnung von Bogenträgern in Verbindung mit einem Streckträger (Lohseträger).* (Calculation of Arched Girders Connected with Transverse Beams.) J. Wanke. Eisenbau. Oct., '21.

Beitrag zur Berechnung von Konsolstreben.* (Contribution to the Calculation of Braces for Brackets.) F. Wansleben. Eisenbau. Dec., '21.

6. Heterogeneous Solids (Reinforced Materials)

Deflection of Reinforced Concrete Beams of Rectangular Cross Section. Frank P. McKibben. Cem. Eng. Mar., '22.

7. Pulverulent Masses (Earth Pressure)

Experiments on the Horizontal Pressure of Sand.* Ponsonby Moore Crosthwaite. Inst. C. E. 1919-20, Pt. 1.

Overturning Moment on Retaining-Walls.* Angus Robertson Fulton. Inst. C. E. 1919-20, Pt. 1.

Progress Report of the Special Committee to Codify Present Practice on the Bearing Value of Soils for Foundations, Etc.* (Presented to the Annual Meeting, Jan. 28, 1922.) Am. Soc. C. E. Mar., '22.

b. Hydraulics

1. Processes of Measurement

Reducing Bend as Venturi Meter in Hydro-Electric Plant.* E. A. Dow. Eng. N. R. Mar. 2, '22.

2. Physical Hydraulics (Orifices, Pipes, Channels, Waves)

The Coefficient of Roughness in Corrugated-Iron Pipe. D. L. Yarnell. Eng. N. R. Mar. 2, '22.

Nouvelle Méthode pour la Détermination des Courbes de Remous.* (New Method for Determining Backwater Curves.) E. Baticle. Gen. Civ. Serial beginning Dec. 3, '21.

3. Industrial Hydraulics (Hydraulic Motors, Water Power, Transmission of Water Under Pressure, Propelling and Elevating Machinery)

The Walkerburn Water Power Mechanical Storage Installation.* Eng. Serial beginning Feb. 17, '22.

The Chippawa-Queenstown Power Canal.* L. H. Burpee. Cornell C. E. Mar., '22.

Hydraulic Equipment as Affecting Power House Design. Max V. Sauer. Can. Engr. Mar. 7, '22.

Features That Increase Reliability in Hydro-Electric Plants.* R. C. Denny. Power Mar. 14, '22.

Ontario "Hydro" Condemned as Wasteful and Expensive. Eng. N. R. Mar. 16, '22.

Electrical Equipment of Hydro-Electric Plants. N. L. Devendorf. Power Mar. 21, '22.

Power Development at High Falls, Que.* A. Langlois. Can. Engr. Mar. 21, '22.

High Head Impulse Wheels at New Feather River Plant.* Albert A. Northrop. Eng. N. R. Mar. 23, '22.

Usine Hydro-Electrique de la Basse-Isère à Beaumont-Monteux (Drôme) et Transport de l'Energie Produite à St.-Etienne (Loire).* (The Lower Isère Hydro-electric Plant at Beaumont-Monteux (Drôme) and the Transmission of the Energy Produced to St.-Etienne (Loire). A. Dumas. Gen. Civ. Feb. 25, '22.

Einiges über den Ausbau der Bayrischen Grosswasserkräfte und deren Nutzung.* (On the Development of the Bavarian Large Water Powers and Their Utilization.) E. Engelmann. Oest. Ing. Arch. Ver. Jan. 20, '22.

Ueber den heutigen Stand des wasserbaulichen Versuchswesens.* (The Present Status of Hydraulic Experimental Work.) E. Meyer-Peter. Schw. Bauz Feb. 11, '22.

c. Pneumatics

2. Physical Pneumatics (Flow of Gases, Waves, Air Resistance, Action of the Wind)

Die Wechselbeziehungen zwischen Verdunstung und Diffusion und die Grösse des Diffusionskoeffizienten für Wasserdampf in Luft.* (The Correlation Between Evaporation and Diffusion and the Magnitude of the Coefficient of Diffusion for Steam in Air.) Gesund. Ing. Sept. 24, '21.

C. Materials of Construction and General Processes

a. Lime, Cement, Mortar, Concrete, Brick, Bitumen, Timber, etc.

Strength and Other Properties of Scots Pine.* Alexander Robert Horne. Inst. C. E. 1919-20, Pt. 1.

Continental Portland Cement Company Increases Capacity.* Cem. Eng. Mar., '22.

Modern Plant for Manufacturing Finished Lime.* Cem. Eng. Mar., '22.

Discussion on Tentative Specifications for Concrete and Reinforced Concrete.* (Submitted as a Progress Report of the Joint Committee on Standard Specifications for Concrete and Reinforced Concrete.) Am. Soc. C. E. Mar., '22.

Large Quarry Rock Crushing and Screening Plant. Hilmer F. Smith. Eng. N. R. Mar. 2, '22.

Municipal Asphalt Plant at St. Catherines, Ont.* W. P. Near. Can Engr. Mar. 7, '22.

Effect of Moisture Content on Concrete.* (From *Bulletin*, Univ. of Ill. Eng. Experiment Station.) Eng. & Contr. Mar. 22, '22.

Wisconsin Produces Aggregates Locally at Low Cost. H. G. Kuehling. Eng. N. R. Mar. 23, '22.

Blocs Athermanes à Vides Chromatiques Employés comme Matériaux de Construction.* (Athermanous Blocks with Chromatic Voids Used as Building Material.) Gen. Civ. Feb. 25, '22.

b. Metals

L'emploi de la Tôle Ondulée pour les Coffrages en Béton Armé.* (Use of Corrugated Iron for Reinforced Concrete Sheathing.) A. de Fontaine. Gen. Civ. Jan. 14, '22.

L'Essai Mécanique des Fils d'Acier.* (Mechanical Testing of Steel Wire.) Gen. Civ. Feb. 11, '22.

e. Earthwork—Cubage—Excavating Machinery

Thrust Boring by Manual Operation.* Engr. Mar. 10, '22.

g. Execution of Works. Specifications

2. Of Concrete

Pouring Concrete Under Water. Sci. Am. Apr., '22.

3. Of Wood

Holzkonstruktionen als Ingenieurbauten.* (Wooden Structures as Engineering Problems.) F. Meyer. Schw. Bauz. Feb. 18, '22.

4. Of Metal

Aus den neuen schwedisch Belastungsbestimmungen für Eisenkonstruktionen zu Haus-Brücken- und Wasserbauten. (The New Swedish Regulations Concerning the Determination of Loads for Steel Construction in Buildings, Bridges and Hydraulic Works.) Saller. Z. d. Bauver. Apr. 9, '21.

D. Highways

a. Location

Utilizing Small Stream Valleys for Traffic Routes.* Jay Downer. Mun. & Co. Eng. Mar., '22.

c. Construction

Factors Determining the Selection of Types of Pavements for City Streets.* C. M. Pinckney. Engrs. & Eng. Feb., '22.

The Relation of City Planning and Zoning to the Selection of Type of Pavement.* Jefferson C. Grinnalda. Engrs. & Eng. Feb., '22.

The Lay-Out and Construction of the New Coast Road, Durham.* W. J. Merrett. Inst. Mun. & Co. Engrs. Feb. 11, '22.

Post-War Works at Plymouth.* T. Peirson Frank. Inst. Mun. & Co. Engrs. Feb. 25, '22.

Building and Maintaining Bituminous Macadam Roads in Franklin County, Ohio. Curtis C. Lattimer. Mun. & Co. Eng. Mar., '22.

Constructing 17½ Miles of Brick Paved Roads in Scott County, Iowa.* H. K. Davis. Mun. & Co. Eng. Mar., '22.

Remedies for Some Common Defects in Road Construction. B. H. Piepmeler. Mun. & Co. Eng. Mar., '22.

Uses of Calcium Chloride in Illinois Highway Work. Mun. & Co. Eng. Mar., '22.

Bituminous Gravel and Sand Roads. W. D. Sohier. (Paper read before Canadian Good Roads Assoc.) Eng. & Contr. Mar. 1, '22.

Construction Features of I. W. Carr Concrete Road.* John C. Searight. Eng. & Contr. Mar. 1, '22.

Importance of Surface Finish of Concrete Roads. H. E. Breed. (Paper read before Am. Road Builders Assoc.) Eng. & Contr. Mar. 1, '22.

Material Inspection Methods of Illinois Division of Highways.* H. F. Clemmer. Eng. & Contr. Mar. 1, '22.

Recent Developments in Road Construction Details. Charles M. Upham. (Paper read before Am. Assoc. of State Highways Officials.) Eng. & Contr. Mar. 1, '22.

The Bates Experimental Road of Illinois.* Clifford Older. (Paper read before Am. Road Builders Assoc.) Eng. & Contr. Mar. 1, '22.

Six Construction Mistakes in One Concrete Road.* George L. Smith. Eng. N. R. Mar. 2, '22.

Calcium Chloride in Concrete Highway Construction.* B. H. Piepmeler and H. F. Clemmer. Eng. N. R. Mar. 9, '22.

Highway Drainage and the Application of Drainage Acts. U. W. Christie. (Paper read before Conference on Road Construction.) Can. Engr. Mar. 14, '22.

d. Maintenance

The Highway Maintenance System of Pennsylvania. W. A. Van Duzer. (Paper read before Assoc. of State Highway Officials.) Eng. & Contr. Mar. 1, '22.

Against Maintenance Guarantees for Roads and Pavements. Edward W. Brush. Eng. N. R. Mar. 2, '22.

Effect of Speed on Highways. W. G. Robertson. (Paper read before Ontario Good Roads Assoc.) Can. Engr. Mar. 14, '22.

Gravel and Stone Road Maintenance. F. Pineo. (Paper read before Conference on Road Construction.) Can. Engr. Mar. 14, '22.

Stone Roads Maintenance. E. A. James. (Paper read before Ontario Good Roads Assoc.) Can. Engr. Mar. 14, '22.

Maintenance of Gravel Roads. D. J. Kean. (Paper read before Ontario Good Roads Assoc.) Can. Engr. Mar. 21, '22.

g. Machinery and Tools

Paving Mixers and Finishing Machines. Eng. N. R. Feb. 23, '22.

h. Vehicles—Automobiles

Highway Transportation. A Symposium. Thomas H. MacDonald, William G. B. Thompson, John N. Cole, E. A. St. John, Edward C. Lunt, Harry Meixell, R. S. Parsons, and G. Wythe Munford. Am. Soc. C. E. Feb., '22.

x. Miscellaneous

Highway Transportation. A Symposium. Thomas H. MacDonald, William G. B. Thompson, John N. Cole, E. A. St. John, Edward C. Lunt, Harry Meixell, R. S. Parsons, and G. Wythe Munford. Am. Soc. C. E. Feb., '22.

Highway Transportation: A Symposium. H. E. Hilts, Frederick Stuart Greene, and Herbert S. Sisson. Discussion. T. Hugh Boorman, Samuel Whinery, John C. Trautwine, Jr., Eugene W. Stern, Henry Goldmark, and H. W. Brown. Am. Soc. C. E. Mar., '22.

Road Building in Panama. J. W. Beardsley. Cornell C. E. Mar., '22.

Road-Building in Ontario. Prevost Hubbard. (Address delivered before the Ont. Good Roads Assoc.) Can. Engr. Mar. 7, '22.

Local Pit Road-Graveling Costs and Performance.* J. A. Prior. Eng. N. R. Mar. 16, '22.

Good Roads System in Ontario. F. C. Biggs. (Address before Ontario Good Roads Assoc.) Can. Engr. Mar. 21, '22.

E. Bridges, Viaducts and Arches

b. Iron or Steel Bridges and Viaducts

Speed in Reconstruction of a Highway Bridge.* Daniel B. Luten. Mun. & Co. Eng. Mar., '22.

The Continuous Truss Bridge Over the Ohio River at Sciotosville, Ohio, of the Chesapeake and Ohio Northern Railway.* Gustav Lindenthal. Am. Soc. C. E. Mar., '22.

Weatherproofing Hudson River Bridge to Save \$400 000 Annually. Mun. & Co. Engr. Mar., '22.

Verfahren zum schnellen Abbau und Einbau einer aus mehreren Blechträgerüberbauten bestehenden Brücke.* (Method for the Rapid Removal and Reconstruction of a Bridge with a Superstructure Consisting of Several Solid Web Girders.) Schaper. Eisenbau May, '21.

Die Ostrawitzbrücke in Mährisch-Ostrau.* (The Ostrawitz Bridge in Mährisch-Ostrau.) Theodor Paul. Eisenbau. Jan., '22.

c. Stone Bridges and Viaducts

The Circular Arch Under Normal Loads: Discussion.* Fred A. Noetzli and William Cain. Am. Soc. C. E. Mar., '22. Die statische Berechnung schiefer Dreigelenkgewölbe.* (Static Calculation of Oblique Three-hinged Arches.) Walter Nakonz. Zeit. Bau. Pt. 4, '20.

d. Concrete and Reinforced Concrete Bridges and Viaducts

Building a Rib-Arch Concrete Bridge in Arkansas.* C. A. Prokes. Eng. N. R. Feb. 23, '22. The New Street Viaduct at Dover.* Eng. Serial beginning Mar. 3, '22. Concrete Bridges and Culverts. W. J. Moore. (From Paper presented before Eighth Annual Conference on Road Constr. for Co. Road Supts. and Engrs.) Can. Engr. Mar. 7, '22.

e. Centerings—Scaffolds

Wind Pressures at High Elevations and Their Application to Radio Towers.* R. Fleming. Eng. N. R. Mar. 16, '22.

f. Suspension Bridges—Transfer Bridges

Plan to Bridge Hudson River at Anthony's Nose.* Eng. N. R. Feb. 23, '22. Der Windverband von Hängebrücken sehr grosser Spannweiten.* (The Windbracing of Large Span Suspension Bridges.) W. Schachenmeier. Eisenbau. Jan., '22.

g. Swing, Bascule, Lift, Floating, Oscillating Bridges; Travelling Cranes

A New Development in Bascule Bridge Design.* Ry. Age Feb. 18, '22. New Type of Trunnion Bascule Bridge: Wabash Ry.* Eng. N. R. Mar. 2, '22. Repairing the Rolling Parts of Two Bascule Bridges.* J. B. Hunley. Eng. N. R. Mar. 9, '22. New Development in Bascule Bridge Design.* Eng. & Contr. Mar. 22, '22.

h. Computations, Tests, etc.

Die Ergänzungsenergie elastischer Systeme.* (The Supplementary Energy of Elastic Systems.) O. Domke. Eisenbau. May, '21. Elastizitätsgleichungen gegenseitiger Unabhängigkeit für einige hochgradig statisch unbestimmte Systeme.* (Mutually Independent Elasticity Equations for Some Highly Static Indeterminate Systems.) Grüning. Eisenbau. Dec., '21. Die Englischen Versuche über die Stosswirkungen in Eisenbahnbrücken.* (English Experiments on the Effect of Impact on Railroad Bridges.) Müllenhoff. Eisenbau. Feb., '22. Einfluss der Fliehkräfte bei Eisenbahnbrücken.* (The Effect of Centrifugal Forces in Railway Bridges.) Kommerell. Z. d. Bauver. Feb. 18, '22.

x. Miscellaneous

Designs and Specifications for Iowa Bridge Construction. J. H. Ames. Eng. Contr. Feb. 22, '22. Economics of Military Bridging.* P. S. Bond. Mil. Engr. Mar.-Apr., '22.

F. Inland Waters

b. Canals (General Articles)

Proposed Great Lakes—Atlantic Canal.* Engr. Mar. 10, '22. Method of Driving the 73 Ft. Wide, 50 Ft. High Rove Barge Canal Tunnel.* (From Compressed Air Magazine.) Eng. & Contr. Mar. 15, '22. Hölzerne Leitwerke am Dortmund-Ems-Kanal.* (Wooden Protective Works on the Dortmund-Ems Canal.) Ellerbeck. Zeit. Bau. Pt. 1, '21. Die Entwässerung des Kaiser-Wilhelm-Kanals und der Bau des Entwässerungssystems bei Holtenau.* (Draining the Kaiser Wilhelm Canal and the Construction of the Discharge Canal at Holtenau.) Rogge and Jordan. Zeit. Bau. Pt. 4, '21.

c. Regulation of Waterways—Volume of Discharge, Freshets, Floods, Soundings

The Flood of September, 1921, at San Antonio, Texas: Discussion. Allen Hazen and Edgar Jadwin. Am. Soc. C. E. Mar., '22. Controlling a Mountain Torrent in Switzerland.* Karl Haller. Eng. N. R. Mar. 2, '22. Curbing the Colorado.* Robert G. Skerrett. Sci. Am. Apr., '22. L'Aménagement Hydraulique du Haut-Rhône. Projet de Déivation Grésin-Monthoux, avec Usine Electrique à Grésin.* (Hydraulic Regulation of the Upper Rhône Grésin-Monthoux Plan for Diversion with an Electric Plant at Grésin.) C. Gémont. Gen. Civ. Feb. 4, '22.

d. Diverting Dams

Core Studies in the Hydraulic-Fill Dams of the Miami Conservancy District.* Charles H. Paul. Am. Soc. C. E. Mar., '22.

e. Locks, Lifts, Elevators, Inclined Planes

Some Notes on the Location and Construction of Locks and Movable Dams on the Ohio River, with Particular Reference to Ohio River Dam No. 18.* William M. Hall. Am. Soc. C. E. Jan., '22. Some Notes on the Location and Construction of Locks and Movable Dams on the Ohio River, with Particular Reference to Ohio River Dam No. 18: Discussion. Thomas P. Roberts. Am. Soc. C. E. Mar., '22.

g. Consolidation of Banks, Leakage, Maintenance of Channel, Dredging

Das Temperaturmessverfahren zur Bestimmung der Sickerwasserverluste von Kanälen.* (Determination of Loss of Seepage Water in Canals by Means of Temperature Measurements.) F. Zunker. Z. d. Bauver. Serial beginning Jan. 7, '22.
Neuer Elmerbagger für Kanalarbeiten.* (Modern Bucket Dredge for Canal Work.) Arnold Lack. Schw. Bau. Serial beginning Jan. 28, '22.

h. Boats, Barges

Eisenbeton-Kahn nach "System Züblin-Koller."** ("Züblin-Koller" Type of Reinforced Concrete Boats.) Schw. Bau. Jan. 21, '22.

j. River and Lake Ports, Equipment

Rangoon Port Development.* J. A. Cherry. Dock & Harbour Feb., '22.
The Possibilities of Detroit as a World Port.* William H. Adams. (Paper read before Am. Assoc. Port Authorities.) Dock & Harbour Feb., '22.

k. Utilization of Inland Waterways, Freight, Capacity

Water Transportation: A Symposium. R. H. M. Robinson, Winthrop L. Marvin, Emory R. Johnson, and Samuel O. Dunn. Am. Soc. C. E. Feb., '22.
Water Transportation: A Symposium: Discussion. Gardiner S. Williams, J. E. Willoughby, John C. Trautwine, Jr., Augustus Smith, C. C. Vermeule, and B. F. Groat. Am. Soc. C. E. Mar., '22.

G. Maritime Works**a. Behaviour of Movements of the Ocean—Winds—Waves—Tides—Currents**

Tidal Characteristics and Their Importance to Engineers.* G. T. Rude. Eng. N. R. Mar. 16, '22.

c. Vessels and Maritime Navigation—Lighthouses and Buoys. Various Signals

An Experimental Determination of the Effect of Varying the Angle of Incidence on the Position of the Centre of Pressure of a Curved Plate Moving Through Water.* John Purser. Inst. C. E. 1919-20 Pt. 1.
Cape Don Lighthouse, Northern Territory, Australia.* Herbert Alfred Jackson. Inst. C. E. 1919-20 Pt. 2.
Coastal Aids to Navigation in Australia: Their Administration and Recent Developments. Joshua Fielden Ramsbotham. Inst. C. E. 1919-20 Pt. 2.
New Lighthouses in Queensland.* Maurice William Mehaffey. Inst. C. E. 1919-20 Pt. 2.
Water Transportation: A Symposium. R. H. M. Robinson, Winthrop L. Marvin, Emory R. Johnson and Samuel O. Dunn. Am. Soc. C. E. Feb., '22.
American Warship Practice.* S. V. Goodall. (Paper read before Portsmouth Eng. Soc.) Eng. Serial beginning Mar. 17, '22.

d. Roads and Outer Harbors. Dikes and Jetties. Breakwaters

Notes on Wave-Action in Harbour Areas; with Special Reference to Works for Reducing It at Blyth and Whitby Harbours.* John Watt Sandman. Inst. C. E. 1919-20 Pt. 1.
Restoration of a Cyclone-Damaged Breakwater-End in Madras Harbour.* Francis Joseph Edward Spring. Inst. C. E. 1919-20 Pt. 2.
The Design of Harbours and Breakwaters with a View to the Reduction of Wave-Action within Them.* Ralph Frederick Hindmarsh. Inst. C. E. 1919-20 Pt. 1.
The Improvement of the Entrance to Sunderland Harbour, with Reference to the Reduction of Wave-Action.* Inst. C. E. 1919-20 Pt. 1.

f. Maritime Rivers and Canals. Bank Protection

Le Tracé du Chenal Maritime dans l'Estuaire de la Seine.* (Plan of the Maritime Channel in the Estuary of the Seine.) Gen. Civ. Feb. 18, '22.
g. Dredges and Dredging. Force Pumps. Refloating and Removing Wrecks. Ice-Breakers A Ship Without a Bottom. Robert G. Skerrett. Sci. Am. Apr., '22.

h. Wharves. Mooring Buoys. Harbor Equipment

Discharge of Grain Cargoes in the Port of London by Pneumatic Elevators.* R. E. Knight. (Paper read before Inst. Mech. Engrs.) Dock & Harbour Mar., '22.

i. Harbors (General Articles)

Whitby Harbour Improvement. James Mitchell. Inst. C. E. 1919-20 Pt. 1.
The Area of Water Surface as a Controlling Factor in the Condition of Polluted Harbor Waters: Discussion. W. C. Purdy, Allen Hazen, and Warren R. Borst. Am. Soc. C. E. Mar., '22.
A Criticism of the New Development Scheme for the Port of Rangoon.* George C. Buchanan. Dock & Harbour. Mar., '22.
Petrograd Harbour.* Dock & Harbour Mar., '22.
Harbour Extension Works at Casablanca, Morocco.* Dock & Harbour Mar., '22.
L'Extension du Port de Marseille et l'Aménagement de l'Etang de Caronte.* (Extension of the Port of Marseille and the Improvement of the Caronte Pond.) M. Bezault. Rev. Gen. Feb., '22.

H. Railroads, Street and Interurban Railways, Automobiles, Aeronautics

a. Railroads

1. General Articles

Railroad Transportation: A Symposium. Howard Elliott, W. N. Doak and F. A. Molitor. Am. Soc. C. E. Feb., '22.

Maintenance in 1921 Failed to Meet Railway Needs. Julius H. Parmelee. Eng. N. R. Mar. 9, '22.

Problem of the Government Railways in Canada.* W. T. Jackman. Ry. Age Mar. 11, '22.

Purchasing on Specifications Viewed from Various Angles. (Abstract of paper read before the New England Railroad Club.) H. P. Hass. Ry. Rev. Mar. 18, '22.

Railway Appliance Exhibition Crowds the Coliseum. Ry. Rev. Mar. 18, '22.

The Railway Engineering Convention.* Ry. Rev. Mar. 18, '22.

Les Chemins de Fer dans les Accords de l'Allemagne avec la France et la Pologne et dans le Traité entre la France et le Gouvernement d'Angora.* (Railroads in the Agreements of Germany with France and Poland and in the Treaty between France and the Government of Angora.) Marcel Peschaud. Rev. Gen. Feb., '22.

Projet d'un Nouveau Régime pour les Chemins de Fer Espagnols. (Proposed New Regime for the Spanish Railways.) Gen. Civ. Feb. 11, '22.

2. Location

Railway Location.* Sidney Blencowe. Inst. C. E. 1919-20 Pt. 1.

3. Roadbed, Construction Work, Tunnels

The Economic Reasons for Building the Clarks Summit-Hallstead Cutoff.* George J. Ray. West. Soc. Engrs. Mar., '22.

Driving a Five-Mile Rock Tunnel for Japan Railway.* Eng. N. R. Mar. 9, '22.

Railway Ditching Machines and Performance Records.* Eng. N. R. Mar. 9, '22.

Der Mergel als Feind des Eisenbahnbaues.* (Marl the Foe of Railroad Superstructure.) Cygan. Z. d. Bauver. Jan. 14, '22.

4. Track

Rail-Creep.* William Prior Hales. Inst. C. E. 1919-20 Pt. 1.

Creosoting Timber on the Santa Fe Railway System. A. F. Robinson. West. Soc. Engrs. Mar., '22.

"Give Her Snoos", Yells the Boss, and the Drive Was On.* R. Van Metre. (Description of Production of Ties in the Western Mountains Where They Must Be Driven in Flood Streams.) Ry. Main. Engr. Mar., '22.

How Rail is Reclaimed on the B. & O.* S. C. Tanner. Ry. Main. Engr. Mar., '22.

Labor-Saving Methods for Cleaning Ballast.* Ry. Main. Engr. Mar., '22.

Railway Crossings Should Receive More Careful Attention.* E. D. Swift. (Abstract of paper read before M. of W. Club of Chicago.) Ry. Main. Engr. Mar., '22.

The Proper Elevation of the Outer Rail. Charles Weiss. Ry. Main. Engr. Mar., '22.

Union Pacific Builds Tie Treating Plant.* Ry. Main. Engr. Mar., '22.

Track Maintenance by Contract on the Canadian Pacific Ry. H. G. Harton. Eng. N. R. Mar. 9, '22.

Unification of Railway Gauges in Australia. Engr. Mar. 10, '22.

Diagram for Calculating Annual Cost of Cross Ties.* Eng. & Contr. Mar. 15, '22.

Railway Curves: Superelevation and Maintenance.* E. E. R. Tratman. Eng. N. R. Serial beginning Mar. 16, '22.

5. Signals and Safety Apparatus

Automatic Train Control System of General Railway Signal Co.* Ry. Rev. Mar. 11, '22.

Finnigan's Automatic Train Control.* Ry. Age Mar. 11, '22.

The Bourdette-Brookins Train Control System.* Ry. Rev. Mar. 11, '22.

The Regan Automatic Train Control Systems.* Ry. Rev. Mar. 11, '22.

The Simplex Train Control System.* Ry. Rev. Mar. 11, '22.

The Union Switch & Signal Company's Automatic Train Control System. Ry. Rev. Mar. 11, '22.

Valve de Queue "Omega" pour Frein Continu Automatique à Air Comprimé.* ("Omega" Tail Valve for a Compressed Air Automatic Continuous Brake.) Gen. Civ. Jan. 7, '22.

Essais d'un Nouveau Système de Frein Westinghouse à Double Capacité.* (Tests of a New Type of Double Acting Westinghouse Brake.) Rev. Gen. Feb., '22.

6. Rolling Stock (Locomotives, Cars)

Improved Hanna Locomotive Stoker, Type H-2.* Ry. Age Feb. 18, '22.

Operating Results Show Savings by Rebuilt Power.* H. F. Grewe. Ry. Age Feb. 18, '22. Simplified System of Car Accounting Saves Large Expense.* J. W. Fox. Ry. Rev. Feb., 25, '22.

Chilean Railways' Electric Passenger Locomotives.* Ry. Age Mar. 4, '22.

The Nottingham Carriage and Wagon Works of Messrs. Cammell Laird and Co., Limited.* Eng. Mar. 10, '22.

Rolled Steel Trailer Wheels for Locomotives.* Ry. Age Mar. 11, '22.

Use of Hard Rubber Battery Jars in Car Lighting.* A. E. Voight. Ry. Age Mar. 11, '22.

Another Advance in Gasoline Rail Car Construction.* Ry. Rev. Mar. 18, '22.

Articulated Trains.* Sci. Am. Apr., '22.

Automotrice à Essence et à Deux Essieux pour Chemins de Fer d'Intérêt Local.* (A Gasoline Rail Motor Car with Two Axles for Local Railroads.) G. Tartary. Gen. Civ. Feb. 4, '22.

Widerstände, Gleisbremsen und Aufzeichnung des Bewegungsvorganges der vom Ablaufberg rollenden Wagen.* (Resistances, Track Brakes and Representation of the Process of Motion of Cars Running Down Hill.) W. Müller. Z. d. Bauver. Jan. 28, '22.

7. Use of Electricity

Rotary Converters and Railway Electrification.* F. P. Whitaker. (Abstract of paper read before the Inst. of Elec. Engrs.) Engr. Feb. 24, '22.

Effects of Electric Power Used for Traction.* Chas. F. Scott. Ry. Age Mar. 18, '22.

8. Stations. Engine Houses. Shops. Terminals

An Engine Terminal for Economical Operation. G. W. Tutan. Ry. Age Feb. 25, '22.
 New Southern Pacific Terminal Building in San Francisco.* Ry. Rev. Feb. 25, '22.
 Novel Methods Feature Turntable Renewal.* R. G. Aylsworth. Ry. Main. Engr. Mar., '22.
 Establishing Icing Facilities (R. R. Refrigeration Plant) on a Large Scale. W. C. Phillips.
 Ry. Age Mar. 4, '22.

Railway Mail Terminal Will Handle Large Tonnage.* Ry. Age Mar. 4, '22.

Improved Lighting and Ventilation for Railway Freight Houses.* G. P. Richardson.
 Eng. N. R. Mar. 9, '22.

Pere Marquette R. R. Builds New Division Terminal.* Eng. N. R. Mar. 9, '22.

Katy Builds Freighthouse of Fireproof Construction.* Ry. Age Mar. 11, '22.

New Railway Mail Terminal in Chicago.* Ry. Rev. Mar. 11, '22.

The New Chicago Passenger Station of the Illinois Central R. R. Eng. & Contr. Mar.
 22, '22.

9. Technical and Commercial Use

Container System Creates Freight Service. Ry. Age Feb. 25, '22.

10. Accidents

Railway Bridge Wreck Charged to Crushing of Pier. (Abstract of Report by Bureau of
 Safety of the Interstate Commerce Comm.) Eng. N. R. Mar. 9, '22.

x. Miscellaneous

Plans for N. R. A. A. Exhibit Complete.* Ry. Main. Engr. Mar., '22.

Let Railways Operate Boat Lines, Army Engineer Advises. Lansing H. Beach. (Abstract
 of address before National Rivers and Harbors Congress.) Ry. Rev. Mar. 18, '22.
 American Railway Engineering Convention.* Eng. N. R. Mar. 23, '22.

b. Special Railroads**2. Aerial Railroads (Funicular, Monorail)**

Les Transporteurs Aériens à Cables. Emploi des Propriétés de la Chainette. Action des
 Charges Isolées.* (Suspended Cable-ways. Use of the Properties of the Catenary. The
 Action of Isolated Loads.) Cretin. Gen. Civ. Serial beginning Jan. 28, '22.

3. Narrow Gauge. Light Railways

The Work Done by Railway Troops in France during 1914-19.* David Lyell. Inst. C. E.
 1919-20 Pt. 2.

A Pump-Power Railroad.* Andrew Goobek. Sci. Am. Apr., '22.

x. Miscellaneous

Transportation Problem Paramount in Plant Construction.* Eng. N. R. Mar. 23, '22.

c. Ferry Boats

The War Department Cross-Channel Train Ferry.* Frederick Owen Stanford. Inst. C. E.
 1919-20 Pt. 2.

d. Street Railways, Elevated Railways, Subways**1. General Articles**

Le Chemin de Fer Métropolitain de Paris. Prolongement de la Ligne No. 3, de la Place
 Gambetta à la Porte des Lilas, avec Raccordement sur la Ligne No. 7, près de la Porte
 du Pré-Saint-Gervais.* (The Paris Metropolitan Railway. Extension of Line No. 3 from
 Place Gambetta to La Porte des Lilas, with Connection to Line No. 7 near La Porte
 du Pré-Saint-Gervais.) L. Biette. Gen. Civ. Feb. 4, '22.

3. Roadbed (Grading Construction Work) Elevated Structure

Storage Yard for Subway Trains.* Arthur E. Clarke. Cornell C. E. Mar., '22.

5. Rolling Stock

Street Railway Used for Freight Container Service.* Eng. N. R. Feb. 23, '22.

Gasoline Motor Cars with Four-Wheel Drive.* Ry. Age Mar. 18, '22.

e. Automobiles**2. Internal Combustion Engine Automobiles**

Tracteur Monoroue, Système l'Hermite.* (Hermite Type of Mono-Wheel Tractor.) Gen.
 Civ. Feb. 11, '22.

f. Aeronautics**1. General Articles**

La 11^e Conférence de l'Air (Londres, Février 1922). (The Second Aviation Congress
 (London, February 1922).) A. Lesage et J. Michaut. Gen. Civ. Serial beginning
 Feb. 25, '22.

Soaring Birdman.* Ladislas d'Orcy. Sci. Am. Apr., '22.

2. Dirigible Balloons

La Résistance des Grands Dirigeables et les Services de Transports Aériens. (The Strength
 of Large Dirigibles and Aerial Transportation Service.) A. Poidlouë. Gen. Civ. Feb. 18, '22.

3. Aeroplanes

The Progress of Research. R. K. Bagnall-Wild. (Abstract of paper read before Air Con-
 ference.) Engr. Feb. 10, '22.

Die neuere Theorie der Tragflügel und Luftschauben. (Modern Theory of Supporting Wings
 and Air Propellers.) E. Everling. Ver. deu. Ing. Oct. 29, '21.

x. Miscellaneous

Portes Basculantes, Cintrées et Equilibrées, pour Hangars d'Aviation.* (Curved and Counter-
 balanced Bascule Doors for Hangars.) Gen. Civ. Feb. 11, '22.

I. Municipal Water-Works. Agricultural Engineering

a. General Articles

Revamping the Artesian Water Supply of Bryan, Ohio.* Eng. N. R. Mar. 2, '22. Entwurf für die Wasserversorgung und Entwässerung der Stadt Ujvidek in Ungarn, jetzt Novi Sad in Jugoslavien.* (Plan for Water Supply and Drainage of the City of Ujvidek in Hungary, Now Novi Sad in Jugo-Slavia.) Emerich Forbath. Gesund. Ing. Serial beginning Oct. 15, '21.

b. Hydrology. Water Resources

Construction Progress of the Hetch Hetchy Water Supply of San Francisco, California.* M. M. O'Shaughnessy. Am. Soc. C. E. Feb., '22. A Sanitary Survey of Lake Erie, Opposite Cleveland, Ohio, 1920.* J. W. Ellms. Am. W. W. Assoc. Mar., '22.

Wirtschaftlichkeit und Frischwasserklärung bei dem O M S-Verfahren im Gegensatz zu nebengelagerten Schlammmärläumen. (Economy and Clarification by the O M S Method Compared with Septic Tanks.) Schieckel. Gesund. Ing. Oct. 22, '21.

c. Dams and Reservoirs

Siphon Spillways.* G. F. Stickney. Am. Soc. C. E. Feb., '22. Waterproofing a Leaky Reservoir at Nashville, Tenn.* Eng. N. R. Feb. 23, '22. The Relation Between Deflections and Stresses in Arch Dams: Discussion. L. Standish Hall, William A. Miller and Chauncy Wernecke.* Am. Soc. C. E. Mar., '22. Concrete Dam 22 Feet High Built With Traveling Form.* Eng. N. R. Mar. 16, '22. Huge Water Storage Projects for New Jersey District.* Eng. N. R. Mar. 16, '22. Influence de l'encastrement latéral dans les grands barrages.* (The Effect of Lateral Rigidity in Large Dams.) H. Juillard. Schw. Bauz. Serial beginning Dec. 3, '21. Vor-und Sturzbetten an Stauanlagen mit besonderer Berücksichtigung der Wehranlagen auf angeschwemmten Untergrunde.* (Rear and Fore Aprons of Storage Dams with Special Consideration of Dams on Alluvial Subsoil.) F. W. Schmidt. Zeit. Bau. Pt. 7, '20. Der Einfluss von Ueberfallausschnitten auf der Abmessungen von Sperrern.* (The Effect of the Weir Section on the Dimensions of the Dam.) Leo Hauska. Oest. Ing. Arch. Ver. Feb. 3, '22.

d. Analysis and Purification of Water

A Comparison of the Hardness of Public Water Supplies in Massachusetts, New York and New Jersey. Waldo S. Coulter. Mun. & Co. Eng. Mar., '22.

A Facultative Spore-Forming Lactose-Fermenting Organism from Iowa Surface Waters (B. Macerans).* Jack J. Hinman, Jr., and Max Levine. Am. W. W. Assoc. Mar., '22.

Applications of Colloid Chemistry to Study of Filter Effluents.* Malcolm Pirnie. Am. W. W. Assoc. Mar., '22.

Fifteen Years of Investigations by the Laboratories of the Metropolitan Water Board.* Melville C. Whipple. Am. W. W. Assoc. Mar., '22.

Symposium on the Centralized Softening of a Public Water Supply. Mun. & Co. Eng. Mar., '22.

The Loading of Filter Plants.* H. W. Streeter. Am. W. W. Assoc. Mar., '22. The Probable Formation of Phenolic Compounds by a Chlorinated Water in Contact with a Coal Tar Paint. C. A. Hechmer. Am. W. W. Assoc. Mar., '22.

The Water Supply of the Niagara Frontier. R. C. Snowden. Am. W. W. Assoc. Mar., '22. Water Softening as a Factor in Municipal Supply. Wm. M. Barr. Am. W. W. Assoc. Mar., '22.

Water Sanitation at Krug Park Swimming Pool, Omaha, Nebraska. R. N. Perkins. Am. W. W. Assoc. Mar., '22.

Erfahrungen über Trinkwasserversorgung im Felde und über einen neuen Trinkwasserbereiter. (Experiences with the Purification of Drinking Water in the Field and with a New Purifier for Drinking Water.) Konrich. Gesund. Ing. Jul. 2, '21.

Neun Jahre Praktische Erfahrungen mit dem Chlorgas-Verfahren zur Sterilisation von Trink- und Badewasser und zur Entgeruchung, Entkeimung und Fäulnisverhinderung von Abwasser. (Nine Years' Practical Experience with the Chlorine Gas Method of Sterilization of Drinking and Bathing Water and De-odorizing, Sterilization and the Prevention of Putrefaction of Waste Water.) G. Ornstein. Gesund. Ing. Aug. 20, '21.

Die Wasserentkeimung mittels ultravioletten Strahlen im Felde.* (Sterilization of Water in the Field by Ultra-Violet Rays.) A. Heilmann. Gesund. Ing. Oct. 8, '21.

e. Distribution of Water

Water Waste Survey and Metering in Detroit City.* George H. Fenkell. Can. Engr. Feb. 28, '22.

Construction Progress in the Cleveland Division of Water. A. V. Ruggles. Am. W. W. Assoc. Mar., '22.

Determining by a Single Flow Test the Capacity of a Meter at All Pressure Losses.* Fred. B. Nelson. Am. W. W. Assoc. Mar., '22.

Electrical Operation of Gate Valves. Peter Payne Dean. Am. W. W. Assoc. Mar., '22.

Mechanical Aids for Distribution Work in Detroit, Michigan.* W. Montgomery Mitchell. Am. W. W. Assoc. Mar., '22.

Prevention of Electrolysis Troubles in Underground Pipe Structures. E. B. Stewart. Am. W. W. Assoc. Mar., '22.

A \$60 000 000 Addition to Boston District Water Supply. Eng. N. R. Mar. 2, '22.

Broken Section of Pipe Line Burned Out by Electric Torch Under 50 Ft. of Water.* William W. Brush. Eng. N. R. Mar. 2, '22.

Thin Concrete Lining Successful in Irrigation Canals.* R. C. E. Weber. Eng. N. R. Mar. 16, '22.

Condition of Wood-Stave Pipe on Reclamation Projects.* William H. Nalder (From *Reclamation Record*). Eng. N. R. Mar. 23, '22.

Nomogramm für volllaufende Kreis- und Eiprofile.* (Nomograms for Circular and Egg-shaped Profiles at Maximum Flow.) Strobel. Gesund. Ing. May 7, '21.
 Die Technische Eroberung des Lovcen. (Technical Conquest of Lovcen.) F. Schönbrunner. Oest. Ing. Arch. Ver. Serial beginning Dec. 2, '21.
 Zur Dimensionierung von Druckleitungs-Fixpunkten.* (The Dimensioning of Pressure Mains.) H. Hürzeler. Schw. Bauz. Feb. 25, '22.

f. Drainage of Land

Methods and Cost of Maintenance of Drains on U. S. Reclamation Service Projects.* C. E. Lounsherry (From *Reclamation Record*). Eng. Contr. Mar. 8, '22.

J. Sewerage. Sewage and Refuse Disposal

a. Sewers and Drains

Post-War Works at Plymouth.* T. Peirson Frank. Inst. Mun. & Co. Engr. Feb. 25, '22.
 The Use of Concrete Pipe for Building Storm and Sanitary Sewers.* M. W. Loving. Can. Engr. Mar. 7, '22.
 Cost of Sewer Construction at Louisville, Ky.* Eng. & Contr. Mar. 8, '22.
 Intercepting Sewer in the Essex Border District.* M. E. Brian. (Paper read before the Assoc. of Ontario Land Surveyors.) Can. Engr. Mar. 21, '22.
 Zur Frage der zweckmässigen Anordnung von Abwasserdücker und ihrer Spülung.* (On the Question of the Suitable Arrangement and Washing of Waste Water Siphons.) Gustav O. A. Liebau. Gesund. Ing. Jul. 23, '21.
 Strassensinkkästen Bauart Hollenbeck D. R. G. M. (On Street Catch-Basins, Hollenbeck Patent System.) G. Spiegelberg. Gesund. Ing. Aug. 27, '21.
 Die Entwicklung und der derzeitige Stand der Kanalisation Wiens.* (The Development and Present Status of the Vienna Sewer System.) W. Voit. Gesund. Ing. Serial beginning Sept. 3, '21.
 Nomogramm für volllaufende Kreis- und Eiprofile. (Nomograms for Circular and Egg-shaped Profiles at Maximum Flow.) Strobel. Gesund. Ing. May 7, '21.
 Druckwasserabsenkung mittels der Abwasserkanäle in unter Hochwassereinwirkung stehenden Stadtteilen.* (Drainage of Parts of the City Subject to High Water Effects, by Means of Waste Water Canals.) W. Breitung. Gesund. Ing. Serial beginning Jun. 18, '21.
 Kanalschacht-Abdeckungen für schweren Verkehr.* (Drainage Pipe Manholes for Heavy Traffic.) P. May. Gesung. Ing. Sept. 10, '21.
 Ueber Strassensinkkästen.* (Street Catch-Basins.) P. May. Gesund. Ing. Oct. 1, '21.
 Wirtschaftlich-technische Gesichtspunkte für den Entwurf von Kanalisationsnetzen.* (Economic Technical Viewpoints for the Design of Canalization Systems.) Friedr. Münkner. Gesund. Ing. Nov. 26, '21.
 Zur Berechnung offener Abwasserkanäle.* (Calculation of Open Waste Water Canals.) Imhoff. Gesund. Ing. Dec. 17, '21.
 Ueber die Bestimmung der in Sinternetzen abzuführenden grosssten sekundlichen Regenwassermengen.* (On the Determination of the Greatest Quantity of Rainwater Drawn Off per second in a Drainage System.) Hugo Eigenbrodt. Gesund. Ing. Serial beginning Jan. 7, '22.

b. Sewage Disposal. Purification

Experiments on Grease-Interceptors.* Henry Edgar Thompson. Inst. C. E. 1919-20.
 The Miles Acid Process of Sewage Treatment.* F. W. Mohlman. Engrs. Soc. W. Pa. Oct. '21.
 The Design of Aeration Units and Sedimentation Tanks for the Activated Sludge Sewage Disposal Plant at Milwaukee, Wisconsin.* Darwin W. Townsend. Am. Soc. C. E. Jan., '22.
 Activated Sludge Sewage Disposal Plant.* Darwin W. Townsend. Eng. Serial beginning Feb. 17, '22.
 Uses of Centrifuges for Sewage Sludge Dewatering.* T. Chalkley Hatton. (From paper read before Am. Public Health Assoc.) Eng. N. R. Feb. 23, '22.
 Colloid Chemistry and Its Relation to Tank Treatment of Sewage.* F. W. Mohlman and Langdon Pearse. Am. W. W. Assoc. Mar., '22.
 Stream Pollution and Sewage Disposal: A Symposium: Discussion, John A. Griffin and Clarence E. Keeler. Am. Soc. C. E. Mar., '22.
 German Sewage-Works for Houses and Public Buildings.* Karl Haller. Eng. N. R. Mar. 16, '22.
 Clarification and Activation for Indianapolis Sewage.* C. H. Hurd. Eng. N. R. Mar. 23, '22.
 Die Feldberegnung mit städtischen Abwassern unter besonderer Berücksichtigung der "Phoenix-Regen-Rieselanlage".* (Watering Fields with City Waste Water with Special Consideration of the "Phoenix" Sprinkling Apparatus.) Martin Strell. Gesund. Ing. May 28, '21.
 Untersuchungen über die Wirkung der langsamten Sandfiltration.* (Investigations on the Effect of Slow Sand Filtration.) W. Hilgers and L. Lauter. Gesund. Ing. Jul. 30, '21.
 Die Müllverwertung durch Schmelzung.* (The Utilization of Domestic Refuse by Fusion) Hermann Koschmieder. Gesund. Ing. Aug. 27, '21.
 Die biologische Abwasserklärungsanlage der Heilstätte Sülzhayn i. Harz der Norddeutschen Knappschafts-Pensionskasse Halle a. S.* (The Biological Waste Water Purifying Installation of the Sülzhayn Sanatorium in Harz of the North German Miners' Benevolent Society.) G. Ziegler. Gesund. Ing. Serial beginning Sept. 3, '21.
 Unfälle durch Vergiftung mit Gasen in Kanalisationswerken. (Accidents Due to Poisoning from Gases in Sewage Works.) W. Leybold. Gesund. Ing. Dec. 31, '21.
 Verhütung von Unfällen durch Gasvergiftung in Kanalisationswerken.* (Prevention of Accidents Due to Gas Poisoning in Sewage Works.) W. Leybold. Gesund. Ing. Dec. 31, '21.

c. Refuse Disposal

Die Müllbeseitigung in Leipzig. (The Removal of Domestic Refuse in Leipzig.) Willy Schmitt. Gesund. Ing. Serial beginning Feb. 11, '22.

K. Heat Engines**a. Steam Engines. Boilers**

The Reversed Heat Engine as a Means of Heating Buildings.* T. B. Morley. Engr. Feb. 10, '22.

Expansion Line on the Indicator Diagram.* Power Feb. 28, '22.

The Still Engine for Marine Propulsion.* Archibald Rennie. (Paper read before the Inst. of Engrs. and Shipbuilders.) Eng. Serial beginning Mar. 3, '22.

Ideal Expansion in the Steam Engine.* Power Mar. 7, '22.

Die Verbrauchszahlen der Kolbendampfmaschinen und ihre Beurteilung.* (Consumption Figures of the Piston Steam Engine and Their Evaluation.) R. Doerfel. Ver. deu. Ing. Serial beginning Jan. 28, '22.

b. Gas and Oil Engines

Experiments on Water-Injection in a Gas-Engine and its Effect upon Heat-Distribution.*

William John Walker. Inst. C. E. 1919-20 Pt. 2.

Efficiency of the Diesel Oil Engine.* L. H. Morrison. Power Feb. 28, '22.

L. Electricity**a. Production of Electricity****1. Storage Batteries and Cells**

Fortschritte in der Verwendung von Akkumulatoren.* (Progress in the Utilization of Accumulators.) H. Beckmann. Ver. deu. Ing. Serial beginning Jan. 28, '22.

2. Magneto and Dynamo. Electric Machines

Ueber das Pendeln von parallel geschalteten Wechselstrom-Generatoren.* (On the Hunting of Alternating Current Generators Connected in Parallel.) J. Fischer-Hinnen. Schw. Bauz. Serial beginning Jan. 14, '22.

b. Distribution and Transmission of Electricity**1. Power Plants**

Electric Power in the French Base Ports, A. E. F.* Allen E. Ransom. Mil. Engr. Mar.-Apr., '22.

Usage Hydro-Electrique de la Basse-Isère à Beaumont-Monteux (Drôme) et Transport de l'Énergie Produite à St-Etienne (Loire).* (The Lower Isère Hydroelectric Plant at Beaumont (Drôme) and the Transmission of the Energy Produced to St-Etienne (Loire).) A. Dumas. Gen. Civ. Feb. 25, '22.

2. Long-Distance Transmission of Energy

Die Freiluft-Schaltstation Gösgen für 50/135000 Volt.* (The Gösgen Out-door Sub-station for 50/135000 Volts.) Schw. Bauz. Jan. 7, '22.

Zur Wahl der Stromart für Grosskraftübertragungen.* (Choice of the Kind of Current for Power Transmission.) Berthold Simon. Ver. deu. Ing. Jan. 7, '22.

3. Distribution and Wiring of Electricity

Skin Effect and Proximity Effect in Tubular Conductors.* Herbert Bristol Dwight. A. I. E. E. Mar., '22.

Cutouts in Motor Circuits and Their Location.* Edgar P. Slack. Power Mar. 7, '22.

4. Measures. Meters. Rate-Making

Transformer Connections for Power-Factor Meter.* Victor H. Todd. Power Mar. 7, '22.

Methods of Measuring Temperatures in Electrical Machinery.* S. H. Mortensen. Power Mar. 14, '22.

5. Transformers and Converters

An Analytical Investigation of the Causes of Flashing of Synchronous Converters.* E. B. Shand, A. I. E. E. Mar., '22.

Condenser Discharges Through a General Gas Circuit.* Charles P. Steinmetz. A. I. E. E. Mar., '22.

6. Safety of Electric Distribution Systems—Laws and Regulations

Resistance Neutralization; An Application of Thermionic Circuits.* Edward Bennett and Leo James Peters. A. I. E. E. Mar., '22.

d. Mechanical Uses of Electricity**1. Electric Motors**

Heating of Railway Motors in Service and on Test-Floor Runs.* G. E. Luke. A. I. E. E. Mar., '22.

2. Servomotors, Hoists, Elevators, Handling Machinery

Selection of Electrical Apparatus for Cranes.* R. H. McLain. A. I. E. E. Mar., '22.

f. Signals and Communication

Key West-Havana Submarine Telephone Cable System.* W. H. Martin and others.

A. I. E. E. Mar., '22.

M. Architecture**a. Educational, Government and Scientific Buildings**

The Meteorological Laboratory of the Canadian Survey. Eng. March 3, '22.

b. Business and Commercial Buildings

Fireproof Office Building Gutted by Severe Exposure Fire.* Eng. N. R. Mar. 23, '22. Berücksichtigung des Winddruckes bei hohen amerikanischen Bauten.* (Taking into Consideration the Wind Pressure on Tall American Buildings.) Stephen Prager. Zeit. Bau. Pt. 1, '21.

c. Residences. Hotels

The National Housing Problem: Broad Economic Phases of the Housing Problem. Lawson Purdy: Housing: Broad Economic Aspects. John M. Gries: The National Housing Problem: Planning and Zoning. Joseph C. Wagner: The Relation of Zoning to the Housing Problem. B. Antrim Haldeman: City Planning in Relation to the Housing Problem. Charles M. Reppert: Water Supply. H. Malcolm Pirnie: The Basic Principles of the Public Sewerage of Municipalities. W. L. Stevenson: Legislation and Financing. Allan Robinson: Legislation and Financing. Edward M. Basset: Legislation and Financing. William H. Ham: Legislation and Financing. John Ihlder. Am. Soc. C. E. Feb., '22. The National Housing Problem: A Symposium.* Charles Wellford Leavitt, Andrew J. Thomas, Morris Knowles, and Ernest P. Goodrich. Discussion, D. L. Turner, F. W. Look, William T. Lyle, and William H. Ham. Am. Soc. C. E. Mar., '22. Congrès Interallié pour Déterminer la Politique de l'Habitation et du Plan Urban et Rural tenu à Londres en 1920.* (Inter-Allied Congress to Determine the Policy of Housing and of the Urban and Rural Plan, held at London in 1920.) M. De Heem. Ann. T. P. Belg. Dec., '21. Le Château de Mariemont.* (Mariemont Castle.) M. E. Piens. Ann. T. P. Belg. Dec., '21. Das Bürgerhaus in der Schweiz. Band X: Das Bürgerhaus im Kanton Zug.* (Dwellings in Switzerland. Vol. 10: Dwellings in Zug Canton.) Schw. Bauz. Feb. 4, '22.

d. Storage Buildings

Lesson of Chicago Grain Elevator Explosion; 1921. David J. Price and Hylton R. Brown. Eng. N. R. Feb. 23, '22.

h. Roofs. Domes

Design and Construction Features of Steel Frame Roof of Large Rink.* Eng. & Contr. Mar. 22, '22.

i. Fire Protection

La Protection Contre l'Incendie par l'Ingnifugation des Tissus et des Bois. Application Spéciale aux Décors de Théâtres. (Fire protection by Rendering Cloth and Wood Non-Flammable. Special Application to Theatre Hangings.) André Kling and Daniel Florentin. Gen. Civ. Serial beginning Feb. 25, '22.

x. Miscellaneous

Standardization of Building Codes. (Assoc. General Contrs. of America.) Eng. Contr. Feb. 22, '22. Some Municipal Works at Romford.* F. G. Beaumont. Inst. Mun. & Co. Engrs. Mar. 11, '22. Building Cost Index of the Associated General Contractors.* (From Index.) Eng. & Contr. Mar. 22, '22. The Ratio of Labor to Materials Cost in Buildings. Halbert P. Gillette. Eng. & Contr. Mar. 22, '22. Relative Cost of Building Construction for the Last 9 Years.* Halbert P. Gillette. Eng. & Contr. Mar. 22, '22. The Accumulated Deficiency in Building Construction and the Building Outlook.* Leonard P. Ayres (Abstract of an address before the Associated General Contrs.) Eng. & Contr. Mar. 22, '22.

N. Landscape Engineering

Address on Zoning. Edward M. Bassett. Engrs. & Eng. Feb., '22. Propose Zoning Ordinance for Philadelphia.* Joseph C. Wagner and George R. Mackenzie. Engrs. & Eng. Feb., '22. The National Housing Problem: Broad Economic Phases of the Housing Problem. Lawson Purdy: Housing: Broad Economic Aspects. John M. Gries: The National Housing Problem: Planning and Zoning. Joseph C. Wagner: The Relation of Zoning to the Housing Problem. B. Antrim Haldeman: City Planning in Relation to the Housing Problem. Charles M. Reppert: Water Supply. H. Malcolm Pirnie: The Basic Principles of the Public Sewerage of Municipalities. W. L. Stevenson: Legislation and Financing. Allan Robinson: Legislation and Financing. Edward M. Basset: Legislation and Financing. William H. Ham: Legislation and Financing. John Ihlder. Am. Soc. C. E., Feb., '22. The Cleveland Thoroughfare Plan. (From pamphlet issued by the City Plan Commission of Cleveland.) Eng. Contr. Feb. 22, '22. The National Housing Problem: A Symposium.* Charles Wellford Leavitt, Andrew J. Thomas, Morris Knowles, and Ernest P. Goodrich. Discussion, D. L. Turner, F. W. Look, William T. Lyle, and William H. Ham. Am. Soc. C. E., Mar., '22. The Montreal Situation with Reference to Town Planning. Jamse Ewing. (Paper read before Town Planning Conference.) Can. Engr. Mar. 21, '22.

O. Administration—Legislation—Economics—Statistics**a. General Legislation**

Réglementation de la Qualification d'Ingénieur. (Regulation of the Qualifications of Engineers.) Gen. Civ. Feb. 18, '22.

b. Economic Questions of a General Character; Valuations, etc

Les Manifestations Economique et Sociales en 1921. (Economic and Social Manifestations in 1921.) Rémy Roura. Gen. Civ. Feb. 4, '22.
 A Reply to Edison's Questionnaire on the Issuance of Money Based on Property. Halbert P. Gillette. Eng. & Contr. Mar. 8, '22.
 Recognition of an Undepreciated Rate Base in Some Recent Decisions. W. H. Blood, Jr. Eng. & Contr. Mar. 8, '22.

d. Economic Role, Administrative and Financial Management of Means of Communications; Rates, Conditions and Statistics of Transportation**5. Railroads and Street Railways**

On the Question of Net Cost; Rates.* Henry Gréard. Int. Ry. Assoc. Feb., '22.
 On the Question of Workmen's Dwellings.* Fausto Lolli. Int. Ry. Assoc. Feb., '22.
 The Reconstruction of the Organization and Administration of the Swiss Federal Railways. R. Winkler. Int. Ry. Assoc. Feb., '22.

e. Legislation—Questions Concerning Wages and Working Conditions

Labor Board Begins Hearings on Wage Reductions. Ry. Age Mar. 11, '22.

f. Engineering Ethics

A Code of Ethics for Engineers. Min. & Metal. Mar., '22.

x. Miscellaneous

Plan Filing for Railway and Municipal Engineers. J. Taylor Thompson. Eng. March 3, '22.
 Cost Accounting and Bookkeeping Records for Consulting and Practicing Engineers. Arthur L. Mullergren. (Paper read before Am. Assoc. of Engrs.: Conference of Practicing Engrs.) Eng. & Contr. Mar. 8, '22.

Q. Surveying and Geodesy

Precise Levelling.* Ernst Olaf Henrici. Inst. C. E. 1919-20 Pt. 1.
 Sources of Error in Photographic Surveying.* William Norman Thomas. Inst. C. E. 1919-20 Pt. 2.

Report of Committee on Topographical and Exploration Surveys. (Report read before Assoc. of Land Surveyors.) Can. Engr. Feb. 28, '22.

A Review of Important Developments in the Science of Cadastral Resurveys as Executed by the United States Government, with Ethical Discussion Thereof: Discussion. H. B. Patten and J. F. Le Baron. Am. Soc. C. E. Mar., '22.
 Rectification d'une Appréciation Erronée au Sujet du Millième. (Rectifying an Erroneous Idea as to the Mil.) D. Gautier. Gen. Civ. Feb. 25, '22.